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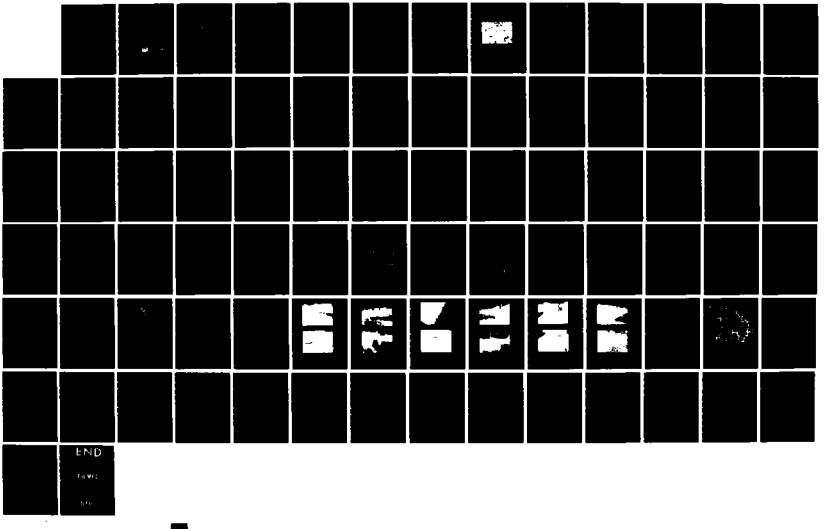

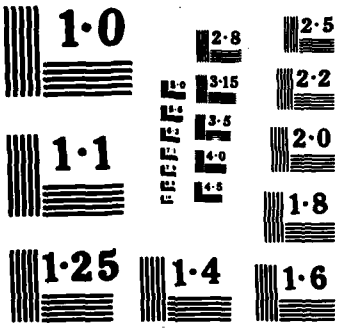

NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

MERRIMACK RIVER BASIN
TILTON, NEW HAMPSHIRE

TILTON TOWN DAM
NH 00151

STATE NO 237.02

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

JULY 1979

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NH 00151	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Tilton Town Dam NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE July 1979 13. NUMBER OF PAGES 35
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,

Merrimack River Basin
Tilton, new Hampshire
Winnipesaukee River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

THe dam is 192 ft. long with a hydraulic height of 13 ft. The dam is in poor condition. Major concern is the poor condition of the timber frame spillway and wooden decking. It is small in size with a significant hazard potential.

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NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT

Identification No.:	NH00151
Name of Dam:	Tilton Town Dam
Town:	Tilton
County and State:	Belknap, New Hampshire
River:	Winnipesaukee River
Date of Inspection:	April 6, 1979 and April 24, 1979

BRIEF ASSESSMENT

Tilton Town Dam has a hydraulic height of 13 feet and a total length of 192 feet. It is a low, run-of-the-river dam and consists of a timber frame spillway with wooden upstream decking placed between two concrete sluiceways each controlled by a timber gate. The dam spans a reach of the Winnipesaukee River and is located in south central New Hampshire. The drainage area to the site consists of 473 square miles and includes the 363 square mile Lake Winnipesaukee drainage area. Maximum storage capacity is about 50 acre-feet. Tilton Town Dam is used to provide pondage for process water and water for an auxiliary fire pump. The pond at spillway crest is 1450 feet in length with a surface area of about 4 acres.

The dam is in poor condition. Major concern is the poor condition of the timber frame spillway and wooden decking.

Based on small size and significant hazard classification in accordance with Corps guidelines, the test flood is ½ the Probable Maximum Flood (PMF). A test flood discharge of 7,570 cfs (16 csm) would overtop the dam by about 2.6 feet (5.6 feet over spillway crest) assuming both gates closed. The spillway will pass 2200 cfs or about 29 percent of the test flood. A major breach at top of dam would probably result in the loss of a few lives and could cause appreciable property damage.

The owner, the Town of Tilton, should implement the results of the recommendation and remedial measures given in Sections 7.2 and 7.3 or alternative in Section 7.4 within one year after receipt of this Phase I inspection report.

Warren A. Guinan
Project Manager
N.H. P.E. 2339

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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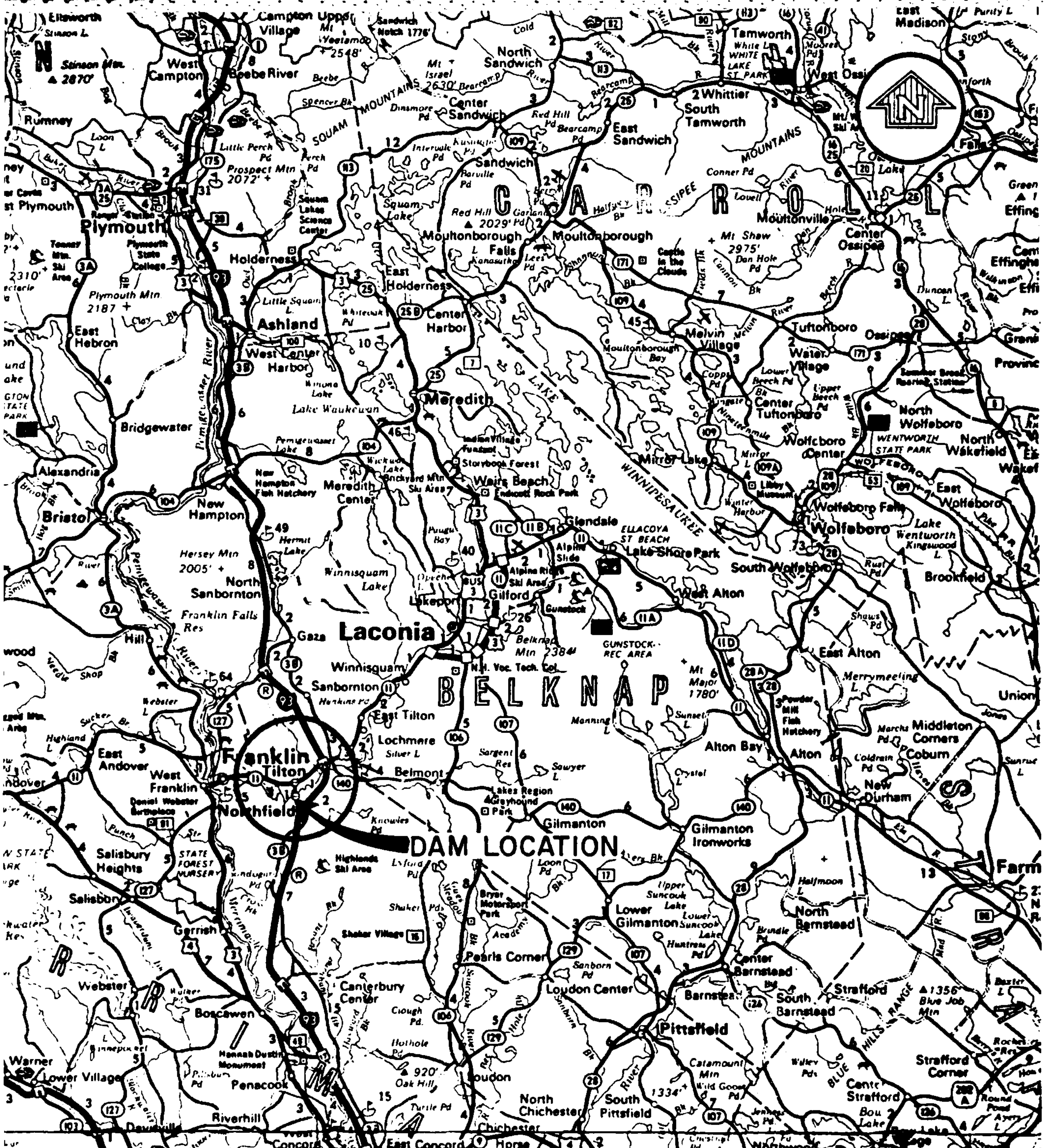
Figure 1 - Overview of Tilton Town Dam.



SCALE IN MILES

0 5 10

MAP BASED ON STATE OF NEW HAMPSHIRE OFFICIAL HIGHWAY MAP

Anderson-Nichols & Co., Inc. CONCORD NEW HAMPSHIRE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

TILTON TOWN DAM LOCATION MAP

WINNIPESAUKEE RIVER NEW HAMPSHIRE

SCALE: SEE BAR SCALE

DATE: JULY 1979

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
TILTON TOWN DAM

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Anderson-Nichols & Company, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of New Hampshire. Authorization and notice to proceed were issued to Anderson-Nichols under a letter of November 20, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0009 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) To encourage and prepare the States to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. Tilton Town Dam is located in the Towns of Tilton and Northfield, New Hampshire. The dam is a run-of-the-river dam spanning the Winnipesaukee River approximately 5.3 miles above its confluence with the Pemigewasset River. The centerline of the river serves as the boundary between Tilton and Northfield. The Merrimack River originates at the confluence of the Winnipesaukee and Pemigewasset Rivers in Franklin, New Hampshire. Tilton Town Dam is shown on U.S.G.S. Quadrangle, Penacook, New Hampshire with coordiantes approximately at N 43° 26' 33", W 71° 35' 43". Tilton is located in Belknap County; Northfield is located in Merrimack County. (See Location Map, page vii.)

b. Description of Dam and Appurtenances. Tilton Town Dam a low, run-of-the-river dam totaling 192 feet in length and ving a hydraulic height of 13 feet. The north abutment of the m is located in Tilton and consists of a concrete sluiceway th discharge controlled by a timber gate. The timber gate is 6'H x 6'W and has an invert 3 5 feet below the spillway crest. e maximum gate opening is 11.6' above the sluiceway invert. It operated by means of a mechanical lifting device (chain hoist). 10-inch intake is located on the upstream side of the wingwall this gate structure. This intake provides water for use in e Arthur S. Brown Manufacturing Company plant building which is cated just adjacent to the north abutment. The spillway consists a timber frame structure about 124 feet in length. The spillway est is 9.6 feet above the downstream toe of the dam. The south utment of the dam is located in Northfield and consists of a ncrete sluiceway with discharge also controlled by a timber gate. e timber gate is 8.3'H x 10'W and has an invert 6 feet below the illway crest. The maximum gate opening is 11.7' above the sluice- y invert. This gate is now raised mechanically by an external vable power source (bucket loader) but could be raised by a heavy ain hoist. A concrete box inlet structure is constructed on the stream side of the south sluiceway wingwall. There is a 10-inch pe inlet from this structure supplying an auxiliary fire pump the Surrette Storage Battery Company, a factory on the south de of the river immediately downstream of the dam.

c. Size Classification. Small (hydraulic height - 13 feet; orage - 50 acre-feet) based on height and storage ($<$ 40 feet d $\geq$ 50 to $<$ 1,000 acre-feet) as given in Recommended Guidelines r Safety Inspection of Dams.

d. Hazard Classification. Significant Hazard. A major each at top of dam would probably result in the possible loss a few lives and could cause appreciable property damage. (See ction 5.1 f.)

e. Ownership. Tilton Town Dam was constructed prior to 86. The earliest ownership recorded appeared on a New Hampshire ter Resources Board (NHWRB) inspection report dated 8/30/34. is report states that the Tilton (north) side of the dam is owned the Public Service Company of New Hampshire and the Northfield outh) side by the Elm Mills Woolen Company. This ownership parently remained unchanged until the Town of Tilton purchased e dam and property March 8, 1968.

f. Operator. The current owner and operator of the Tilton wn Dam is the Town of Tilton, Town Hall, 145 Main Street, lton, New Hampshire 03276. Phone: (603) 286-4425.

g. Purpose of Dam. The purpose of the original construction the dam is not known. Sometime prior to 1934 the dam was ilized for power generation to both of its co-owners, Public rvice Company of New Hampshire and Elm Mills Woolen Company. A WRB inspection report of December 17, 1934 states that the

Tilton side of the dam (Public Service Company) was not operating. The pondage behind the dam is presently used to supply several plants with industrial process water. A NHWRB memo of October 15, 1976 reflects this pondage was also used to dilute sewage from a few lines which discharge into the pond above the dam. An article which appeared in the Concord Monitor, Monday, April 30, 1979, reflects that this dam is currently being considered as a future source of hydroelectric power. (See Appendix B.)

h. Design and Construction History. Tilton Town Dam was constructed sometime prior to 1886. No information was disclosed regarding the original design and construction of the dam. A NHWRB inspection report dated 6/25/36 reported the center portion of the dam was damaged in the flood of March 1936 but was repaired immediately. A NHWRB sketch dated 9/18/39 reflects a 107-foot long spillway, two adjacent gate structures forming the south abutment, and one wood flume forming the north abutment. Further information was obtained from a study done by Fenton G. Keyes Associates, Hydraulic Calculations for the Winnipesaukee River from Lake Winnipesaukee to the Merrimack River, prepared for the New England Division, U.S. Army Corps of Engineers, January, 1957. The above report reflects two gates exist, one 8.6-foot wide gate on the north end and one 8.2-foot wide gate on the south end. The spillway in this report was noted to be 124.5 feet in length. Therefore, structural modifications occurred between the years of 1939 and 1957. Additional structural changes in the gate sluiceways have occurred after 1957. The structure as seen on the visual inspection consisted of a sluiceway with a 5.6'H x 6'W gate on the north side which was reported to have been constructed in 1969 and a sluiceway with a 8.3'H x 10'W gate on the south side which was reported to have been constructed in 1974. These two dates were obtained orally from the owner.

i. Normal Operating Procedures. No written operating procedures were disclosed. The gates are normally opened in the spring and closed in mid July. The water level is watched by a staff member of the Arthur S. Brown Manufacturing Company plant and conditions are relayed to the town. The Town of Tilton Road Agent operates the gates as deemed necessary.

1.3 Pertinent Data

a. Drainage Area. The drainage area consists of 473 square miles (302,720 acres) of varied terrain and includes the 363 square mile Lake Winnipesaukee drainage area. The Winnipesaukee River originates at Lake Winnipesaukee and flows in a southwesterly direction through Paugus Bay, Opechee Bay, Winnisquam Lake, Silver Lake and the communities of Laconia, Belmont, Tilton, Northfield and Franklin. Three dams affect flood control on the Winnipesaukee River. The Lakeport Dam, located between Paugus Bay and Opechee Lake, regulates the elevation of Paugus Bay and Lake Winnipesaukee. The drainage area to Lakeport Dam is 363 square miles. Avery Dam, located between Opechee Lake and Lake Winnisquam, has a drainage

ea of 374 square miles. Lochmere Dam, which regulates the er surface of Lake Winnisquam, carries a drainage area of square miles. Tilton Town Dam is located downstream of se three flood control dams on the Winnipesaukee River.

b. Discharge at Damsite

(1) Outlet works (sluices) - 5.6' H x 6'W timber gate nvert elevation of 436.9' MSL. 8.3'H x 10'W timber gate @ ert elevation 434.4' MSL. Combined capacity at top of dam - 0 cfs @ 443.4' MSL.

(2) The maximum discharge at damsite - A U.S.G.S. gaging tion, having a drainage area of 471 square miles, is located 0.4 es upstream of the dam and has a record since January 1937. maximum recorded discharge at the gage is 3,810 cfs which urred during the September 1938 flood. Therefore, the discharge at the dam during the 1938 flood was probably in excess 3,810 cfs. However, a greater discharge may have occurred ing the 1936 flood which is the largest of historical record the Winnipesaukee River, evidenced by high water marks. Also orded are discharges of 3,720 cfs and 3,700 cfs which occurred 1953 and 1954, respectively.

(3) Ungated spillway capacity @ top of dam elevation - 00 cfs @ 443.4' MSL.

(4) Ungated spillway capacity @ test flood elevation - 05 cfs @ 446' MSL

(5) Gated spillway capacity @ top of dam elevation - applicable

(6) Gated spillway capacity @ test flood elevation - applicable

(7) Total spillway capacity @ test flood elevation - 05 cfs @ 446' MSL

(8) Total project discharge @ test flood elevation - 570 cfs @ 446' MSL (with gates closed); 7,570 cfs @ 444.3' MSL ith gates open)

c. Elevation (ft. above MSL)

(1) Streambed at centerline of dam - 430.8 (at downstream e)

(2) Maximum tailwater - During the September 1938 flood h a discharge of 3,810 cfs maximum tailwater is estimated to ve been at 433.5' MSL.

SECTION 7
ASSESSMENT, RECOMMENDATIONS, AND REMEDIAL MEASURES

Dam Assessment

a. Condition. The visual inspection and the comments made revious dam inspection reports, memos, and letters which are lable in the N.H. Water Resources Board files indicate that on Town Dam is in poor condition. The principal concern with ect to the integrity of the dam is the poor condition of the er frame structure and wooden decking of the overflow section he dam. The gate on the south side must be raised by an rnal mechanical force such as a bucket loader, crane, etc. therefore, cannot be removed quickly and easily.

b. Adequacy of Information. The information available is uate to assess the condition of the dam. The conclusions t the condition of the dam are based primarily on the results he visual inspection.

c. Urgency. The recommendation, remedial measures, or rnative in 7.2, 7.3, or 7.4 respectively, should be implemented he owner within one year after receipt of this Phase I report.

d. Need for Additional Information. No additional informa- is needed to assess the condition of this dam.

Recommendation

owner should engage a registered professional engineer to gn and supervise appropriate repairs to the sinkhole over ly pipe in south abutment and to the existing structure such rame, decks, gates, lift mechanisms, etc. Attention should ld be paid to the possibility that the silt collected behind dam may contain pollutants which could affect the downstream hes of the river.

Remedial Measures

a. Operating and Maintenance Procedures. Establish a eillance program for use during and immediately following ods of heavy rainfall, and also a warning program to follow ase of emergency conditions. Institute a program of annual nical inspection after dam is repaired or replaced.

Alternative

owner should engage a registered professional engineer to gn and supervise construction of a suitable replacement dam.

May 5, 1976 note to WRB file - Whirlpool upstream of the timber dam. It appeared that perhaps a section of planking had broken and was letting water through the underside of the dam.

Oct. 15, 1976 WRB internal memo - Evidence of...large whirlpool.... The main dam is in poor condition; the entire decking as well as all the support framing should be replaced. Water was going through the decking in several locations and the crest of the dam sags at the location where the repairs were made some time ago indicating that their (sic) has been a structural failure of the support timbers.... It is my opinion that the structure could fail at any time.

d. Post-Construction Changes. See 1.2 h.

e. Seismic Stability. The dam is located in Seismic Zone 2 and in accordance with the recommended Phase I guidelines does not warrant seismic analysis.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. The timber decking on the upstream face of the dam is in very poor condition. Large quantities of water are leaking through holes in the decking at many locations. Near the south abutment there is a hole several feet in diameter in the decking and there is a whirlpool several feet in diameter over the hole. The timber frame of the dam is also in poor condition.

Several planks near the bottom of the south sluiceway gate were damaged by a beaver. The planking near the bottom of the north sluiceway gate is in poor condition. Several of the planks are bowed downstream and one of the planks is broken. A small sinkhole in the fill above the intake pipe from the reservoir to the industrial plant was observed.

b. Design and Construction Data. A sketch dated 9/18/39 shows a cross section of the dam with vertical 8" x 10" posts on the downstream side, an upstream decking consisting of a double thickness of 2-inch planks and inclined at about 4H:1V, and 8" x 10" horizontal ties in both the longitudinal and transverse directions. This sketch indicates that the timber frame is founded on "ledge". It appears that this sketch shows the condition of the dam as it existed at the time of an inspection of the same date. However, there is an apparent discrepancy because the written inspection report indicates that the dam is founded on hardpan.

It was reported that the north sluiceway was constructed in 1969 and the south sluiceway in 1974.

c. Operating Records. Several references in the available records reflect that the timber-structure of the dam has been in poor condition at various times in the past:

> Dec. 17, 1934 dam inspection report - Dam, timber A frame, condition poor, should be repaired.
>
> June 25, 1936 dam inspection report - Condition poor. Center portion of dam damaged in flood of Mar. 1936. Repaired immediately.
>
> Sept. 18, 1939 dam inspection report - Condition poor.
>
> June 18, 1951 dam inspection report - Timber frame...is rotting and will go in a few years.

on the Winnipesaukee River were determined at Lakeport Dam, Avery Dam, and Lochmere Dam using various hydrologic methods. The peak discharge at the Tilton gage during a 500-year storm was determined to be 7,570 cfs. This gage is located 0.4 miles upstream of Tilton Town Dam. This 500-year flood flow, being approximately the test flood, was utilized in determining the overtopping potential of Tilton Town Dam. The discharge at Lakeport Dam during a flooding event of this magnitude was determined to be 4,300 cfs.

The overtopping analyses indicates that the dam would be overtopped by 2.6 feet (5.6 feet over spillway crest) during the test flood, assuming both gates closed. The maximum spillway capacity at top of dam is 2200 cfs which is 29 percent of the test flood discharge, assuming the dam stayed intact during a flooding event of this magnitude. Assuming both gates closed, a test flood discharge of 7,570 cfs would overtop the dam by 0.9 foot (3.9 feet over spillway crest).

f. Dam Failure Analysis. A major breach at top of dam would result in a discharge of about 4,315 cfs. This flow is similar to the 4,475 cfs used in Reference 5 (see 5.1 b.). Therefore, the profile developed with this discharge could be utilized to estimate the level of probable damages caused by dam failure at top of dam. Included on this profile are elevations of key damage points. From the profile, the only damage caused by a breach would be the Arthur S. Brown Mfg. Company building which is located adjacent to the north abutment of the dam. A portion of this plant is located in the channel and is the working area for two people. The maintenance garage located at the south abutment at times is occupied. Therefore, loss of life is possible. Property damage could be appreciable. Plants which utilize the pondage for process water would be without water. Loss of water could cause substantial damage to the boilers in the Arthur S. Brown Mfg. Company plant. The pondage also supplies water to an auxiliary fire pump. Therefore, Tilton Town Dam was classified Significant Hazard.

eferences 3 and 4: HEC-2 step-backwater computations reflect hat with a discharge of 7,570 cfs an elevation of 445.4' msl ould be reached. The hydraulic input of this study was reviewed nd evaluated. In order to reflect existing conditions, backup rom the 1978 ANCo study (Reference 5) was utilized in developing stage-discharge relationship for Tilton Town Dam. The rating urve developed in the FIS studies, References 3 and 4, ranges .6 to 1.0 foot lower than the rating curve developed for this nspection study.

eference 5: The recommendation of this study was to replace the am with a weir having a crest elevation at least 1.5 feet lower han the existing spillway. From trial HEC-2 runs through this rea, it was determined that lowering the spillway would reduce looding upstream of the dam to the Route 38 bridge crossing. everal companies utilize the pondage for process water. Breaching he dam would create a hardship, therefore, this was not recommended s an alternative.

c. Experience Data. In a NHWRB report of 6/25/36 it was eported that the center portion of the dam was damaged in the lood of March 1936 but was repaired immediately. No recorded ischarge was disclosed for this flooding event. The U.S.G.S. age in Tilton, N.H. came into operation January 1937 and remains n current use. The maximum recorded discharge occurred during he September 1938 flood and was recorded to be 3,810 cfs. No ecords were found that reported any sustained damages to the dam. he 1936 flood, however, is reported to be the largest of historical record on the Winnipesaukee River as demonstrated by high ater marks in the area of the dam. The 1938 profile along with he 1936 high water marks are shown on the Winnipesaukee River lan and Profile, Sheet 1, U.S. Engineer Office, February 1939. ecorded discharges of 3,720 cfs and 3,700 cfs which occurred n 1953 and 1954, respectively, were also obtained.

d. Visual Observations. The dam is in poor condition. The imber spillway has an uneven crest caused by some local support ailures. The timber decking on the upstream face is in very oor condition.

e. Test Flood Analysis. Tilton Town Dam is classified as eing small in size having a hydraulic height of 13 feet and a aximum storage capacity of 50 acre-feet; the dam was determined o have a Significant Hazard Classification. Using the Recommended uidelines for Safety Inspection of Dams, the test flood was etermined to be ½ Probable Maximum Flood (PMF).

he test flood inflow cannot simply be determined by use of the MF guide curves due to the complexity of the hydrologic and ydraulic conditions which comprise the Winnipesaukee River rainage basin. Flooding on the Winnipesaukee River and its ssociated bays and lakes is to a large extent controlled by ochmere Dam on Lake Winnisquam, Avery Dam on the Winnipesaukee iver, and Lakeport Dam between Opechee Lake and Paugus Bay. eferring to the Northfield Flood Insurance Study, peak discharges

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. General. Tilton Town Dam is a low, run-of-the-river dam which impounds a reservoir of small size. The dam has a timber frame spillway with a wooden upstream decking placed between concrete abutments. If this structure were breached, the failed portion of the timber structure could become lodged in a number of other dams and bridges downstream of the dam. Two dams and six bridges are located in the reach on the Winnipesaukee River between Tilton Town Dam and its confluence with the Pemigewasset River, a distance of 5.3 miles.

b. Design Data. The available data pertinent to the Tilton Town Dam comes from five primary sources:

(1) The New Hampshire Water Resources Board (NHWRB) files on the dam;

(2) Hydraulic Calculations for the Winnipesaukee River from Lake Winnipesaukee to the Merrimack River, prepared by Fenton G. Keyes Associates for the Corps of Engineers, New England Division, in 1957;

(3 and 4) The back up files for the Flood Insurance Studies of Tilton and Northfield, New Hampshire, prepared for the Federal Insurance Administration by Hamilton Engineering Associates, Inc. of Nashua, N.H. and Anderson-Nichols & Company, Inc. (ANCo.) of Concord, New Hampshire, respectively.

(5) Hydraulic Engineering Analysis for Evaluating Flood Stage Reduction on the Winnipesaukee River, New Hampshire, prepared by ANCo for the Corps of Engineers, New England Division, December 1978.

The following is a summation of data pertinent to Tilton Town Dam found in each of the above references:

Reference 1: It is the opinion of the NHWRB that this structure has been in poor condition since 1934; NHWRB feels that this dam could fail at any time and should be removed. (See Appendix B and Section 6.1 c.)

Reference 2: The final recommendations of this study with reference to Tilton Town Dam was that the spillway section of the dam be lowered 3.50' and this section be replaced with flashboards or crest gates which can easily be removed or dropped during high flows.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No written operational procedures were obtained for Tilton Town Dam. Flow conditions are watched by a staff member of the Arthur S. Brown Mfg. Company and relayed to the town. The gates are normally open in the spring and closed in mid July. A hand winch is used to open the north gate. Because of the friction caused by hydrostatic pressure the gate on the south side must be raised by an external source of power (bucket loader or crane).

4.2 Maintenance of Dam

The Town of Tilton is responsible for the maintenance of the dam.

4.3 Maintenance of Operating Facilities

No formal maintenance is performed.

4.4 Description of Any Warning System in Effect

No written warning system was revealed.

4.5 Evaluation

The present operational and maintenance procedures are not adequate to ensure proper operation of the gates during high flows. The maintenance procedures are inadequate to ensure that all problems encountered can be remedied within a reasonable period of time. The owner should establish a written operation and maintenance procedure as well as establishing a warning system to follow in event of emergency conditions.

d. Reservoir Area. The watershed above the reservoir is rolling and partially wooded. Numerous structures are built close to the edge of the reservoir immediately upstream of the dam in the Town of Tilton. The Winnipesaukee River, spanned by the Tilton Town Dam is the outlet for Lake Winnipesaukee and flows through Winnisquam Lake and Silver Lake a few miles upstream from Tilton Town Dam. The Arthur S. Brown Manufacturing Company building is located immediately upstream of the dam on the north approach channel. (See Appendix C - Figure 12.)

e. Downstream Channel. The downstream channel is broad, unobstructed by trees and brush, with a boulder and rugged exposed bedrock bottom. (See Appendix C - Figure 13.) A mill building is located on the north side of the channel immediately downstream of the dam. There are also two dams and six bridges spanning the river between Tilton Town Dam and its confluence with the Pemigewasset River about 5.3 miles downstream.

3.2 Evaluation

Based on the visual inspection, Tilton Town Dam appears to be in poor condition. The timber frame dam is so badly deteriorated that it may collapse, particularly during seasonal high water flows. If there are pollutants in the silt behind the dam they could cause significant environmental problems downstream if the dam failed or was breached. The deteriorated condition of the wooden gates could cause loss of water in the reservoir which would also cause the loss of process water to the Arthur S. Brown Manufacturing Company and loss of fire protection water to the manufacturing facility on the south side of the dam.

one cross section shows the timber structure as being founded on "ledge", and one written record indicates that the foundation of the dam is "hardpan". On the basis of a visual inspection from the shoreline downstream of the dam it appears that most of the timber framing of the dam rests on bedrock and that parts of it rests on large boulders.

No evidence of seepage or other problems were observed at the south abutment. A mill building is located at the north abutment. An inspection of the basement of that building did not reveal any signs of seepage or other problems.

c. Appurtenant Structures. Two concrete sluiceways pass through the dam, one at each abutment. (See Appendix C - Figures 8, 9 and 10.) The north sluiceway was reported to have been constructed in 1969; the south sluiceway in 1974.

The sluiceway on the north side is 6 feet wide and the invert of the channel is 3.5 feet below the dam crest. The sluiceway on the south side is 10 feet wide and 3.3 feet below the dam crest at the inlet and 6 feet below crest at the timber gate. Each sluiceway has steel gate slots, cast into the side approximately 12 feet from the upstream end.

Both timber gates were raised at the time of inspection and were observed to be in a deteriorated condition. Several planks near the bottom of the south sluiceway gate were damaged by a beaver. The planking at the bottom of the north sluiceway gate is in deteriorated condition. Several of the planks are bowed downstream and one of the planks is broken. The steel gate slots were observed to have surface rust but were otherwise in good condition.

The concrete walls of the sluiceways were observed to be in good condition except for some minor erosion at the inlet end.

A concrete box inlet structure is constructed on the upstream side of the south sluiceway wingwall. There is a 10-inch pipe inlet from this structure supplying an auxiliary fire pump in a building immediately downstream of the dam. (See Appendix C - Figure 9.) The concrete box appears to have been constructed at the same time as the sluiceway.

A sand fill has been placed between the north abutment and the sluiceway structure at the north end of the dam. A sinkhole, about 18 inches in diameter, was observed at the downstream side of this fill. (See Appendix C - Figure 11.) According to the maintenance manager of the Arthur S. Brown Mfg. Co., the sand fill was placed on top of a wood decking which, in turn, is above the water intake pipe to the mill. Collapse of the decking may have caused the sinkhole.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. Tilton Town Dam is a low, run-of-the-river dam which impounds a reservoir fo small size on the Winnipesaukee River located immediately downstream of Tilton Village. The watershed above the reservoir is rolling and partially wooded. The Winnipesaukee River is the outlet for Lake Winnipesaukee and flows through Winnisquam Lake and Silver Lake a few miles upstream of Tilton Town Dam. The dam is 5.3 miles upstream from the confluence of the Winnipesaukee and Pemigewasset Rivers. There are two dams and six bridges downstream of Tilton Town Dam on the Winnipesaukee River.

b. Dam. Tilton Town Dam consists of a timber-frame spillway with a wooden upstream decking placed between two concrete gated outlet structures. (See Appendix C - Figures 2 and 3). The dam totals 192 feet in length and has a hydraulic height of 13 feet.

During the initial inspection performed April 6, 1979, about one foot of water was flowing over the crest of the spillway. It was noted that the level of the water flowing over the crest was not uniform along the length of the spillway. (See Appendix C - Figure 4.) From this observation it was inferred that local failures have occurred along the length of the structure. A subsequent inspection was performed April 24, 1979, in conjunction with representatives of the New Hampshire Water Resources Board (NHWRB) and the owner, the Town of Tilton. The NHWRB restricted discharge at Lakeport Dam, reducing flow in the Winnipesaukee River. The Town of Tilton opened both gates at Tilton Town Dam and the impoundment behind the dam was lowered so that little water was discharging over the crest of the dam. This enabled a more thorough inspection on the structural condition of the dam.

The timber frame of the dam is, in part, in poor condition and badly deteriorated. Confirmation of some local support failures was made. (See Appendix C - Figure 5.) The timber decking over the upstream face is in very poor condition. (See Appendix C - Figure 6.) Major quantities of water are pouring through large holes in the decking and lesser quantities through leaks along the entire length of the spillway. (See Appendix C - Figure 5.) Near the south abutment is a hole several feet in diameter in the decking and a whirlpool several feet in diameter was observed over this hole. (See Appendix C - Figure 7.)

Extensive outcrops of bedrock were observed on the south bank of the reservoir immediately upstream of the dam. No outcrops of rock were observed on the north bank. In the available records,

SECTION 2
ENGINEERING DATA

2.1 Design

No original design data were obtained for Tilton Town Dam.

2.2 Construction Records

No written construction records were disclosed. The owner stated that the north sluiceway was constructed in 1969 and the south sluiceway was constructed in 1974.

2.3 Operation

No engineering operational data were obtained.

2.4 Evaluation

a. Availability. A search of the files of the NHWRB and direct contact with the owner revealed only a limited amount of recorded information.

b. Adequacy. Because of the limited amount of detailed data available, the final assessments and recommendations of this investigation are based on the hydrologic and hydraulic calculations and the visual inspection.

c. Validity. No original engineering data were obtained. Hydrologic and hydraulic studies done on the Winnipesaukee River (discussed in Section 5.1 b.) were reviewed and validated.

The south abutment also consists of a concrete gate structure with an 8.3'H x 10'W timber gate and head frame. This gate is now raised mechanically by a movable power source (bucket loader). It has a maximum opening of 11.7 feet above the sluiceway invert. On the upstream face of the structure is a 10" intake pipe. This intake supplies water to an auxiliary fire pump for the Surrette Storage Battery Co., a factory on the south bank of the river immediately downstream of the dam.

(3) Height - 13' (structural height)

(4) Topwidth - varied

(5) Side slopes - U/S spillway 4H:1V - U/S abutments vertical; D/S spillway and abutments vertical.

(6) Zoning - none

(7) Impervious core - none

(8) Cutoff - none

(9) Grout curtain - none

h. Diversion and Regulating Tunnel - not applicable (See j. below.)

i. Spillway

(1) Type - timber frame with wooden decking

(2) Length of weir - 124'

(3) Crest elevation - 440.4' MSL

(4) Gates - none

(5) U/S Channel - the upstream channel consists of the Winnipesaukee River. A Boston & Maine Railroad bridge and the Route #38 bridge are located 580 feet and 660 feet upstream of the dam, respectively. The Arthur S. Brown Mfg. Co. plant is located on the north side of the approach channel.

(6) D/S Channel - the downstream channel immediately below the dam is wide and has a boulder strewn and rugged exposed bedrock bottom. No trees, brush or man-made structures obstruct the immediate channel below the dam. The J.P. Stevens Company plant is located downstream on the south side of the channel. Two dams and six bridges have been constructed in the downstream reach of the Winnipesaukee River between Tilton Town Dam and its confluence with the Pemigewasset River in Franklin, New Hampshire, a distance of 5.3 miles.

j. Regulating Outlets. The north abutment of the dam consists of a concrete gate structure with a 5.6'H x 6'W timber gate and head frame. This gate is mechanically operated by a chain hoist and it has a maximum opening of 11.6' above the sluiceway invert. On the upstream side of this structure is a 10-inch process water intake which supplies process water to the Arthur S. Brown Mfg. plant.

(3) Upstream invert north abutment sluiceway - 436.9
Upstream invert south abutment sluiceway - 434.4

(4) Recreation pool - not applicable

(5) Full flood control pool - not applicable

(6) Spillway crest - 440.4

(7) Design surcharge (Original Design) - unknown

(8) Top of dam - 443.4

(9) Test flood pool - 446

d. Reservoir (feet)

(1) Length of maximum pool - 2700

(2) Length of spillway crest pool - 1450

(3) Length of flood control pool - not applicable

e. Storage (acre-feet)

(1) Recreation pool - not applicable

(2) Flood control pool - not applicable

(3) Spillway crest pool - 16 (approximate)

(4) Top of dam - 50 (approximate)

(5) Test flood pool - 80 (approximate)

f. Reservoir Surface (acres)

(1) Recreation pool - not applicable

(2) Flood control pool - not applicable

(3) Spillway crest - 4 (approximate)

(4) Test flood pool - 13 (approximate)

(5) Top of dam - 9 (approximate)

g. Dam

(1) Type - timber frame spillway and wooden upstream deck with concrete sluiceways and abutments at either end.

(2) Length - 192'

APPENDIX A

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Tilton Town Dam, N.H. DATE April 6, 1979

TIME 10:00 A.M.

WEATHER Cold, cloudy

W.S. ELEV. U.S. 441 DN.S. 433.9

PARTY:

1. Warren Guinan (4/24/79)
2. Stephen Gilman (4/24/79)
3. Leslie Williams
4. Ronald Hirschfeld (4/24/79)
5. Pattu Kesavan
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Hydrology/Hydraulics	W. Guinan/L. Williams	
2.	Structural Stability	S. Gilman	
3.	Soils & Geology	R. Hirschfeld	
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Tilton Town Dam, N.H. DATE April 6 & 24, 1979

PROJECT FEATURE Intake Structure & Channel NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Good
Bottom Conditions	Not visible beneath water surface
Rock Slides or Falls	None
Log Boom	None
Debris	Some observed on upstream face below water surface
Condition of Concrete Lining	Good
Drains or Weep Holes	None apparent
b. Intake Structure	
Condition of Concrete	Good,only surface laitance eroded away
[illegible] Slots	Fair, embedded steel surface rusted - no paint
Stoplogs	3" wood weathered - several planks deteriorated and bowed. One plank on north side broken

PERIODIC INSPECTION CHECKLIST

PROJECT Tilton Town Dam DATE April 6 & 24, 1979

PROJECT FEATURE Outlet Structure & Channel NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	Concrete Sluiceways
General Condition of Concrete	Good
Rust or Staining	Only at embedded steel items
Spalling	None
Erosion or Cavitation	Only surface laitance eroded where in contact with water
Visible Reinforcing	None
Any Seepage or Efflorescence	None observed
Condition at Joints	Good
Drain holes	None apparent
Channel	
Loose Rock or Trees Overhanging Channel	Small trees overhanging north side, but channel is wide and unobstructed.
Condition of Discharge Channel	Good

PERIODIC INSPECTION CHECKLIST

PROJECT Tilton Town Dam, N.H. DATE April 6 & 24, 1979

PROJECT FEATURE Spillway Weir NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Timber frame spillway with decking on upstream face
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Not visible beneath water surface
b. Weir and Training Walls	Wood frame-badly deteriorated, one large hole in deck, many small ones. Crest of dam is irregular and sagged.
General Condition of Concrete	
Rust or Staining	Only at tie holes and embedded steel supports
Spalling	None visible
Any Visible Reinforcing	None
Any Seepage or Efflorescence	None
Drain Holes	None
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Small trees overhanging north side, but channel is wide
Floor of Channel	Not visible beneath water surface
Other Obstructions	None

PERIODIC INSPECTION CHECKLIST

PROJECT Tilton Town Dam, N.H. DATE April 6 & 24, 1979

PROJECT FEATURE Service Bridge NAME

DISCIPLINE NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	
Bearings	Not applicable
Anchor Bolts	Not applicable
Bridge Seat	Not applicable
Longitudinal Members	Not applicable
Underside of Deck	Not applicable
Secondary Bracing	Not applicable
Deck	Wood plank 3" thick untreated in weathered condition
Drainage System	Not applicable
Railings	Not applicable
Expansion Joints	Not applicable
Paint	Not applicable
b. Abutment & Piers	See Outlet Structure - Outlet Works
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

PROJECT Tilton Town Dam, N.H. DATE April 6, 1979

PROJECT FEATURE Reservoir NAME L. Williams

AREA EVALUATED	REMARKS
Stability of Shoreline	Good
Sedimentation	None observed
Changes in Watershed Runoff Potential	None significant
Upstream Hazards	Route 38 and Boston & Maine Railroad Bridge
Downstream Hazards	Part of Arthur S. Brown Mfg. Co. plant
Alert Facilities	None posted
Hydrometeorological Gages	U.S.G.S. gage 0.4 miles upstream of dam in Tilton
Operational & Maintenance Regulations	None posted

APPENDIX B

ENGINEERING DATA

Tilton Dam May Create Energy Again

By ANDREW MEANS
Monitor Staff Writer

TILTON — The selectmen will soon have to decide the future of the town-owned dam across the Winnipesaukee River, and one option may be to restore it as a source of hydroelectricity.

Three of the operators of the Sulloway Mill hydroelectric plant in Franklin have approached the Tilton selectmen to find out if the town is interested in selling them the dam to generate electricity.

The three, Ted Larter of Dunstable, Mass., Tony Turgeon of Tilton and John Clement of Franklin, have been asked by selectmen to provide more details of any restoration plan they may have for the dam.

The N.H. Water Resources Board has been concerned about the condition of the dam for some time. The U.S. Army Corps of Engineers is inspecting the dam this week, said Water Resources Engineer Vernon Knowlton.

"After we receive their report we will order the town to either repair it or remove it," said Knowlton, adding that "any interest from anyone wanting to generate hydroelectricity would be helpful."

The dam is over 100 years old, he said, but has not been used to generate power since the ownership was transferred from Public Service Co. of N.H. to the town of Tilton over 10 years ago.

It is currently used to provide water, mainly for processing and emergency firefighting purposes, in two factories, Arthur S. Brown Co. and Surrette Batteries.

If the dam is restored, said Larter, it could generate 800 to 1,000 kilowatts an hour. This could be sold to a power company such as Public Service or, conceivably, used as an emergency standby system for the town.

But Larter stressed that the feasibility is still being studied.

"As a matter of a fact it may not be big enough to make it worthwhile," he said. "All we want to know is whether the town would be willing to convey it over to us for us to start work on it."

Larter said restoration would be a private operation. In the unlikely event that the selectmen decided to keep the dam and repair it, he said, he would be just as happy to buy the water rights alone.

"We have just so much money to spend," he said. "There's a lot of liability that goes along with (the dam)."

Besides the Franklin plant, Larter also owns an operation at Goodrich Falls in Bartlett. N.H. Electric Cooperative buys power from this source, and Public Service buys from the Sulloway Mill plant.

The viability of such plants depends largely on energy policy in general, he said.

5 — CONCORD MONITOR, Monday, April 30, 1979

State of New Hampshire

WATER RESOURCES BOARD

CONCORD 03301

October 15, 1976

Re. Dam #237.02

Board of Selectmen
Town Office
Tilton, N. H. 03276

Gentlemen:

In answer to telephone requests from the town of Tilton for assistance in lowering the water in the Winnipesaukee River so that the Town could make repairs to their dam located adjacent to the Brown Manufacturing Company, an engineer of this office did a preliminary inspection of that dam on October 14th with Mr. Manning, the Road Agent of the Town.

Mr. Manning explained that for sometime the Town has been trying to repair a hole in the decking and with the gates on the dam have not been able to control the flow of water which is at present at 280 cfs. We explained to Mr. Manning and to members of the Board of Selectmen that with our dam at Lochmere being under reconstruction, it is impossible for us to restrict the flow of water from Lake Winnisquam.

During the inspection our engineer, Mr. D. Rapoza, discovered that in addition to the deck which is in extremely poor condition, many of the upright braces supporting the A-frames and the connecting timbers between the A-frames are in a state of decay. One section of the dam's crest is already sagging indicating a structural failure in that section of the timber dam. In our review of the inspection report and our file on this dam, it is our opinion that a loss of the supporting timbers could cause a failure of a portion of this dam "at any time". The uncertainty of when such a failure could occur creates a problem at which the Town is left with a decision to be made, we feel, in the near future.

This Dam #237.02 in the files of the Water Resources Board is classified as a menace structure. This classification indicates that due to its height, storage, and location, failure of the dam could jeopardize the lives and safety of the public. This office has reviewed this classification and feel that a major liability connected with this dam would be following the failure portion of the timber structure could become lodged in a number of bridges and other dams downstream of Tilton perhaps causing structural damage to these facilities.

In reviewing our files and discussing this matter with members of the Board of Selectmen, the Water Resources Board has been on record in the past indicating that if this dam is not serving a useful purpose it would benefit the public if it was removed or lowered substantially since the present dam maintains a high water level throughout the town which reduces the ability to pass flood waters down the Winnipesaukee River. It is our present understanding that the existing dam helps to improve a sewer condition in the town and provides a reservoir for process water for local industry. During the immediate future if the town reconsiders reconstructing this dam, perhaps they should consider reconstructing the dam at a lower height or supplying the water needs to their industry from a different source.

This office wishes to cooperate with the town of Tilton in any way in this matter; and our staff will be available to meet with the town's engineers to discuss this problem at your convenience.

Due to the nature of the condition of this dam, the New Hampshire Water Resources Board requests the town of Tilton to notify us within the next few weeks of its plans to take corrective action regarding the situation that presently exists. Except for what nature might create, the flows in the Winnipesaukee River will not be increased by the operations of Lake Winnipesaukee until the middle of December at which time the flow will be increased to approximately 1,000 cfs which would make repairs to this dam extremely expensive.

Sincerely,

George M. McGee, Sr.
Chairman

GMM/VAK:L

M E M O

E: October 15, 1976

Vernon A. Knowlton, Chief Water Resources Engineer

M: Donald M. Rapoza, Civil Engineer

JECT: Dam repairs on Town owned structure (Dam #237.02)

On October 14, 1976 I met with Mr. Raymond Manning, Road Agent for Town of Tilton, regarding the repairs he wish to make on the town ed dam (#237.02) on the Winnipesaukee River in Tilton.

Some time ago, the town repaired a hole in the wooden deck planking h a weighted (manhole cover or frame) sheet of plywood. With the sage of time, the plywood repairs have not solved the problem, as dence of the large whirlpool at the location of the plywood.

Mr. Manning has opened both gates at the structure in order to er the pool elevation and with the present flow the pool has only pped approximately 2 to 3 feet below the crest of the spillway. Mr. ning wanted to know if we could reduced the flow in the Winnipesaukee er so that the town can make the repairs in relatively shallow water.

I also spoke with Mr. Frank Ponton, Maintenance Supervisor for the hur S. Brown Manufacturing Company, and he informed me that the pany is not pleased with our attitude, relative to maintaining a dam the site. He mentioned that the company is dependent on a pondage is quite concerned in having the dam properly maintained. They have ended $5,000.00 within the last six months to buy a pump for use of cess water at the site. He stated that the town is responsible and an obligation to keep and maintain the dam for water uses as well as uting a few sewage lines which discharge into the pondage.

As for the dam the abutments and gates are in good condition, but main dam is in poor condition; the entire decking as well as all the port framing should be replaced. Water was going through the decking several locations and the crest of the dam sags at the location where repairs were made some time ago indicating that their has been a uctural failure of the support timbers.

The Town should be made aware of the present condition of the ucture as it is my opinion that the structure could fail at any time.

/kn

NOTE FOR THE FILE - May 5, 1976

Mr. Mundy, Selectman, Town of Tilton, called regarding the development of a whirlpool upstream of the timber dam owned by the Town downstream of the bridge in the village.

They inquired whether a permit was required to lower the water to make necessary repairs.

After discussing the issue with Mr. Mundy it was my recommendation that they lower the water as soon as possible to make sure no damage was being done to the foundation. It appeared that perhaps a section of planking had broken and was letting water through the underside of the dam.

He will contact us if he feels they need assistance.

V.A.Knowlton:L

THE STATE OF NEW HAMPSHIRE

Belknap ss. June 24 1969

STATEMENT OF INTENT TO CONSTRUCT OR

RECONSTRUCT A DAM AT Tilton

RECEIVED
JUN 25 1969
NEW HAMPSHIRE
WATER RESOURCES BOARD

ER RESOURCES BOARD:

compliance with the provisions of RSA 482:3.

e selectmen of the Town of Tilton, NH

ate name of person or persons, partnership, association, corporation,

ate our intent to the Water Resources Board to construct, to reconstruct, epairs to, a dam along, or (cross out portion not applicable) across:

Winnepesaukee River

state name of stream or body of water)

Adjacent to Tilton Farming Corp.

(Here give location, by distance from mouth of stream, county or

al boundary)

n (s) of Tilton, NH.

ance with PRELIMINARY PLANS, and SPECIFICATIONS FILED WITH THIS STATEMENT A PART HEREOF.

understand that more detailed plans and specifications may be requested

ard in conformance with RSA 482:4 and that, if such plans are requested, ion will not commence until such plans have been filed with and approved ard.

Report - Dam Inspection

Tilton #2 I-3898

Winnipesaukee River, Tilton & Northfield, Tilton side, 1/2 dam owned by the Public Service Company of New Hampshire, about 10' head, Northfield side 1/2 dam owned by the Elm Mills Woolen Company about 10½ head. Power dam, on basis of 75% - 80%, time - efficiency, 365 H.P., 2533000 Kw-hr. per year; on basis of 90% - 80%, time efficiency, 316 H.P. , 2077000 Kw-hrs. per year. As developed, Tilton side not operating. Dam, timber A frame, condition poor, should be repaired, inspected 6-30-34, no record of any previous inspection found, for additional information see I-3898.
Flood study not made. The following information was given me as coming from Mr. Harry Daniell Lakeport Dam. His recollection of maximum discharge at the Lake accurred 10 or 12 years ago and reached 1800 cu. ft. over spillway and through gates. The spillway capacity of this dam is greater than 1800 cu. ft.

S. J. Lord

December 17, 1934

NEW HAMPSHIRE WATER RESOURCES BOARD

INVENTORY OF DAMS AND WATER POWER DEVELOPMENTS

425 USGS
WRB (476)

IN Merrimack NO. 2 — [illegible] — E-3695
ER Winnipesaukee MILES FROM MOUTH D.A.SQ.MI. 418
N Tilton OWNER Elm Mills ± Public Service Co of N.H. ±
AL NAME OF DAM Upper Dam
LT prior to 1886 DESCRIPTION "A" Frame — Timber on Hardpan (Wood Crib AE)

D AREA-ACRES DRAWDOWN FT. POND CAPACITY-ACRE FT.
GHT-TOP TO BED OF STREAM-FT. 16 (13.25) MAX. MIN.
ERALL LENGTH OF DAM-FT. 170 MAX. FLOOD HEIGHT ABOVE CREST-FT.
MANENT CREST ELEV. U.S.G.S. 441.92 LOCAL GAGE
LWATER ELEV. U.S.G.S. LOCAL GAGE
LLWAY LENGTHS-FT. 50 and 57 FREEBOARD-FT. 4 (2.73 AE)
ASHBOARDS-TYPE, HEIGHT ABOVE CREST None
TE GATES-NO. WIDTH MAX. OPENING DEPTH SILL BELOW CREST

1	10.5		7.51

MARKS Condition Poor. Center portion of dam damaged in flood of Mar. 1936. Repaired immediately

H

Coordinates from AE.
43° 25' + 9400 ft
71° 35' + 2900 ft.

WER DEVELOPMENT

ITS	NO.	RATED HP	HEAD FEET	C.F.S. FULL GATE	KW	MAKE
	1	100	11			43" Propeller [illegible]
	1				30	[illegible] 125 Volts D.C.
		400	10	USGS list		

E Power Public Utility

MARKS Mill Closed Head 10.5 ft on Tilton 5003 Menace
Got information from Wm H Anderson, Chief Mechanic Elm Mills.

6/25/36 AE

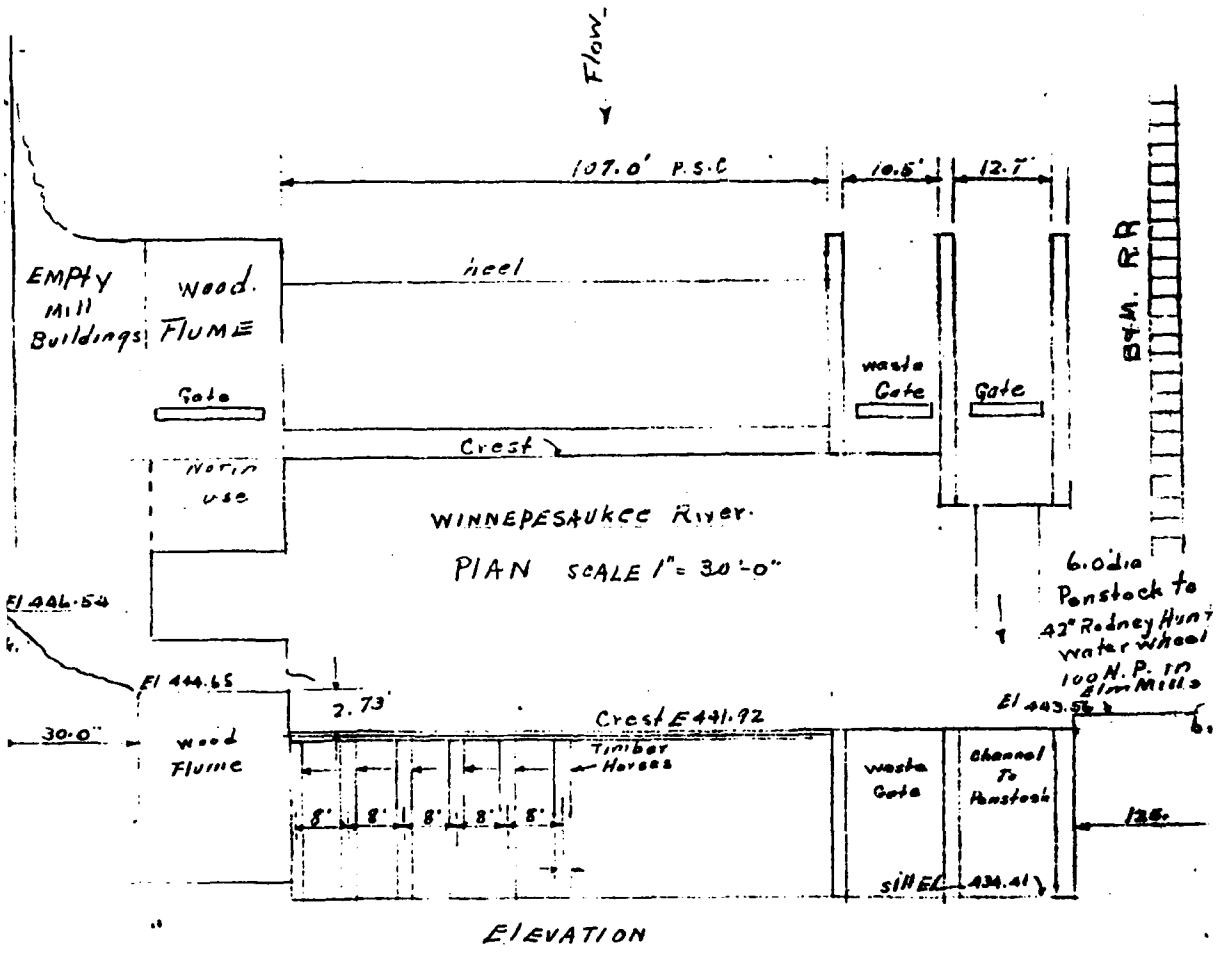
E 8/30/34

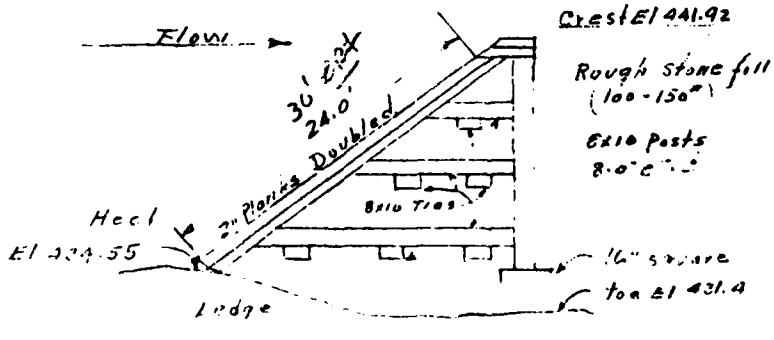
PROJECT FILE 237.02

SUBJECT WINNEPESAUKEE R. TILTON ACC

WINNEPESAUKEE MERRIMACK ELM MILLS P.S. Co.

COMPUTER G.S.W CHECKER C.L.F CONT. FROM ACC. CONT. ON ACC. SUMMARY ON ACC. DATE 9/18/39





7208

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON WATER POWER DEVELOPMENTS IN NEW HAMPSHIRE

LOCATION AT DAM NO. 237.02

Town Tilton : County Belknap

Stream Winnipesaukee R.

Basin-Primary Merrimack R. : Secondary Winnipesaukee R.

Local Name Upper Dam

GENERAL DATA

Head-Max. ..... ft.: Min. ..... ft.: Ave. ..... ft.

Date of Construction ..... : Use of Power Industrial&Public Utility

Pondage ..... ac. ft.: Storage ..... ac. ft.

DESCRIPTION Timber on hard pan

Racks

Size of Rack Opening .....

Size of Bar ..... : Material .....

Area: Gross ..... Sq. Ft.: Net ..... sq. ft.

Head Gates

Type .....

Number ..... : Size ..... ft. high x ..... ft. wide

Elevation of Invert ..... : Total Area ..... sq. ft.

Hoist .....

Penstock

Number 2. : Material 1,wooden 1,steel

Size ..... : Length .....

Turbines

Dam No. 237.02

rth side of Dam,Tilton side owned by Public Service.Mill closed.10.5 head feet.
uth Side-6.0'dia penstock ,11head feet.48"Rodney Hunt Northern 125 V 240A. D.C.
orthfield Side. 100H.P. (ABANDONED)

19..... .....

19..... ..... : 19..... .....

19..... ..... : 19..... .....

OWNER Elm Mills ½ Public Service of N.H. ½

B-17

Tabulation By RLT Date 9/18/39

NEW HAMPSHIRE WATER CONTROL COMMISSION
DATA ON DAMS IN NEW HAMPSHIRE

ATION STATE NO. 237.02

own Tilton : County Belknap

ream Winnipesaukee R.

asin-Primary Merrimack : Secondary Winnipesaukee R.

ocal Name Upper Dam

oordinates—Lat. 43° 25'+-9500 : Long. 71° 35'+-2900

IERAL DATA

rainage area: Controlled ..... Sq. Mi.: Uncontrolled ..... Sq. Mi.: Total ..... Sq. Mi.

verall length of dam 170 ft.: Date of Construction Prior to 1886

eight: Stream bed to highest elev. 16 ft.: Max. Structure 12 ft.

ost—Dam : Reservoir

SCRIPTION Timber on hard pan "A" Frame

Waste Gates

Type

Number 1 : Size ft. high x 10.5 ft. wide

Elevation Invert : Total Area sq. ft.

Hoist

Waste Gates Conduit

Number : Materials

Size ft.: Length ft.: Area sq. ft.

Embankment

Type

Height—Max. ft.: Min. ft.

Top—Width : Elev. ft.

Slopes—Upstream on: Downstream on

Length—Right of Spillway : Left of Spillway

Spillway

Materials of Construction Timber

Length—Total 50 and 57' ft.: Net 107 ft.

Height of permanent section—Max. 12' ft.: Min. 12' ft.

Flashboards—Type None : Height ft.

Elevation—Permanent Crest 441.92 : Top of Flashboard

Flood Capacity cfs.: cfs/sq. mi.

Abutments

Materials:

Freeboard: Max. 4 ft.: Min. ft.

Headworks to Power Devel.—(See "Data on Power Development")

OWNER Elm Mills ½ Public Ser. Co. ½

REMARKS Condition poor.

Tabulation By RLT Date 9/18/39

121284

Elm Mills 1
OWNER Public Service Co. of N.H. ADDRESS ..... CASE NO. .....
Contractor ..... : Address .....

Construction Record

Date Office-Routine	Inspection During Construction					
	Date	Inspector	Memo	Date	Inspector	Memo
Application Received						
Board Approval						
Authorization Sent						
Final Plans Rec'd						
Final Approval-Board						
Final Approval-Sent						
Case Closed						

Is Dam a Menace .....
Why .....

Dam Inspection Record

Date	Inspector	Comments	Memo Prepared	Memo Sent To Owner
10/15/41	R.S.B.&J.H.S.	Fair condition - Penstock intake in poor condition- Elm Mills		
.....	.....	.....	.....	.....

Form No. E61A 8442

NEW HAMPSHIRE WATER CONTROL COMMISSION — RECORD OF DAM NO. 237.02

Town Tilton : County Merrimack : Local Name

Function of Dam Power : Type Timber - A Frame

Primary Basin Merrimack : Sec. Basin Winnipesaukee River : Local Stream Winnipesaukee River

Drainage Area, Total 476 sq. mi. : Controlled sq. mi. : Net Uncontrolled sq. mi.

Reservoir Area, Full Pond acres : At Max. Drawdown acres

Reservoir Capacity mcf. : ac. ft. : in. net D. A. : in. Total D. A.

Overall Length of Dam 170 ft. : Max. Depth Water at Dam ft.

Net Spillway Length 107 ft. : Minimum Freeboard 2.75 ft.

Spillway Capacity cfs. : cfs. per sq. mi.

Highest Flood Flow of Record cfs. : cfs. per sq. mi. : Date

Estimated Maximum Probable Flood cfs.

REMARKS:

Card Prepared by J.H.S. : Checked by : Approved for File : Date 10/21/41

NEW HAMPSHIRE WATER CONTROL COMMISSION

REPORT ON DAM INSPECTION

TOWN Tilton DAM NO. 237.02 STREAM Winnipesaukee River
Mt. Stevens Northfield Franklin, N.H.
OWNER Tilton Realty Co. - Tilton ADDRESS Tilton N. H.

In accordance with Section 20 of Chapter 133, Laws of 1937, the above dam was inspected by me on 6/18/51 accompanied by _____

NOTES ON PHYSICAL CONDITION

Abutments Fair

Spillway Fair -

Gates South side gate in poor condition. Timber frame to gate structure is rotting and will go in a few years - with little damage downstream. Tilton side → Riverside gate operable landside gate closed & inoperable.

Other _____

CHANGES SINCE LAST INSPECTION _____

FUTURE INSPECTIONS Yes

This dam (is) (~~is not~~) a menace because of lack of development downstream at rivers edge

REMARKS About 6" over Spillway.

Copy to Owner	Date

C. [illegible]
INSPECTOR

(Additional Notes Over)

UBLIC SERVICE
Company of New Hampshire 1087 Elm Street, Manchester, N. H. 03105

July 7, 1967

JUL 10 1967

NEW HAMPSHIRE
WATER RESOURCES BOARD

Mr. George M. McGee, Chairman
N. H. Water Resources Board
State House Annex
Concord, New Hampshire

Dear Mr. McGee:

We own a dam in the Town of Tilton on the Winnipesaukee River located directly behind the Tilton Leather Company. This dam does not have any use to the Public Service Company of New Hampshire and we have reviewed the use to the industries in the area. We have also discussed the ownership of the dam with the Towns of Tilton and Northfield.

To leave the dam in the river would require a sizeable sum of money for maintenance; therefore, we propose to remove the dam this fall working out with the industries that are involved a connection to the river so that they can take water for processing purposes.

If you have any questions as to the planned action, we will be pleased to hear from you.

Very truly yours,

Eliot Priest
Vice President

EP:p
c.c. D. E. Sinville
W. A. Adams, Jr.
L. O. Wilson

July 17, 1967

Mr. Eliot Priest, Vice President
Public Service Company of New Hampshire
Manchester, New Hampshire

Dear Mr. Priest:

In reply to your letter of July 7, 1967, this Board has no objection to removal of your dam directly behind Tilton Leather Company. In fact, this removal will substantially lower the flood crests through the compact area of Tilton.

Very truly yours,

George M. McGee, Sr.
Chairman

gmcg:c
cc: U.S.G.S.

September 25, 1967

Mr. Eliot Priest, Vice President
Public Service Company of New Hampshire
Manchester, New Hampshire

Dear Mr. Priest:

Regarding your letter of August 31, 1967 relating to the dam in the towns of Tilton and Northfield directly behind the Tilton Leather Company on the Winnipesaukee River, we understand that the Town of Tilton wishes to take title to the dam and related property.

We have discussed the town retaining this dam with both Mr. Prescott, Chairman of the Board of Selectmen and Mr. Wadleigh, Chairman of the Planning Commission. We were informed that the town's interest at present is to eliminate possible health and unsanitary conditions that would be caused if this dam was removed at this time. We also understand that water users adjacent to the dam would have to provide a more costly way of utilizing water from the stream should this dam be removed.

The Water Resources Board is of the opinion that this dam should be removed in the future if these other problems are eliminated. Its removal would provide for greater discharge capacity through this section of the Winnipesaukee River which, in the past during high flood flows caused damage to property owners along the river upstream of the dam.

Very truly yours,

George H. McGee, Sr.
Chairman

gmcg:c
cc: Mrs. Prescott
Mr. Wadleigh

September 25, 1968

Board of Selectmen
Tilton
New Hampshire 03276

Gentlemen:

Some time ago, personnel from this Board talked with you concerning repairs to the gate section in the former Elm Mills dam across Winnipesaukee River after the Town of Tilton acquired it from Public Service Company of New Hampshire. This Board expected you would notify this Board of the nature of the repairs to be undertaken. As yet, no plans have been received and the Town of Tilton now has title to this dam.

This work should be completed before the fall rains raise the river and before the spring freshets arrive. The present condition of the gate section is such that heavy flows could cause a serious failure, flooding downstream establishments for which you could be liable.

I await your plans to repair this gate section in a manner to prevent failure and insure the safety of the structure. In case you should desire it, you could arrange for Water Resources Engineer, Vernon A. Knowlton, to discuss this matter with you at Concord.

Very truly yours,

George M. McGee, Sr.
Chairman

GMM/FCM/m

Town of Tilton

New Hampshire 03276

OFFICE OF SELECTMEN

RECEIVED
OCT 21 1968
N.H. WATER RESOURCES BOARD

October 21,1968

Water Resources Board
State House Annex
Concord N. H.

Dear Sir:

We are requesting permission to open the gate on the Northfield side of the former Public Service Dam which the Town of Tilton now owns. We wish to lower the river for one day (next Saturday) so Mr. Dick Persons of "Person's Concrete" can estimate the cost of erecting a ten foot concrete wall. It is our intention to have this wall built to stop the flow through the gate on the Tilton side and to remove this gate after the wall is completed. At this time we only wish to try to lower the the river with this one gate. It is possible later on other ways of lowering the river may have to be undertaken when the footings and wall are to be poured. We are hoping that the raising of the Northfield gate will serve our purpose at these partcular times . The gate will be closed on Sunday to allow the river to return to it's natural flow by Monday. Your urgent answer is requested. Thank you.

Donald B. Joscelyn
Chairman Board of Selectmen
Tilton N. H.

The purpose of the proposed construction is To repair the dam 5
(Here briefly state use to
gate by bypassing it with a cement wall
which stored water is to be put)

The construction will consist of
(Here give brief description of
work contemplated including height of dam)
Cement wall construction (details forwarded to
Water Resources Board( )

All land to be flowed is not owned by applicant.

Raymond H. Hitchings
Board of Selectmen
Town of Tilton N.H
Address 67 School St
Tilton, N.H

Note: This statement together with plans, specifications and information and data filed in connection herewith will remain on file in the office of the Water Resources Board. This statement is to be filed in duplicate.

7949

TOWN NO. 1 TOWN Tilton, N. H. NO. 103b PAGE NO. 6

NAME OF COMPANY Elm Mills Woolen Company

HOME ADDRESS Tilton, N. H.

DRAINAGE AREA 418 SQ. MI. HEAD 14 FT.

RIVER Winnepesaukee RATE SEC. FT. PER SQ. MI. 90% TIME .7

RESOURCES

FOR CENTRAL STATIONS		FOR ISOLATED INDUSTRIAL PLANTS	
WHEEL CAP. H. P.	PRIMARY H. P. 90% TIME	WHEEL CAP. H. P.	PRIMARY H. P. 90% TIME
		300	186.18

USES

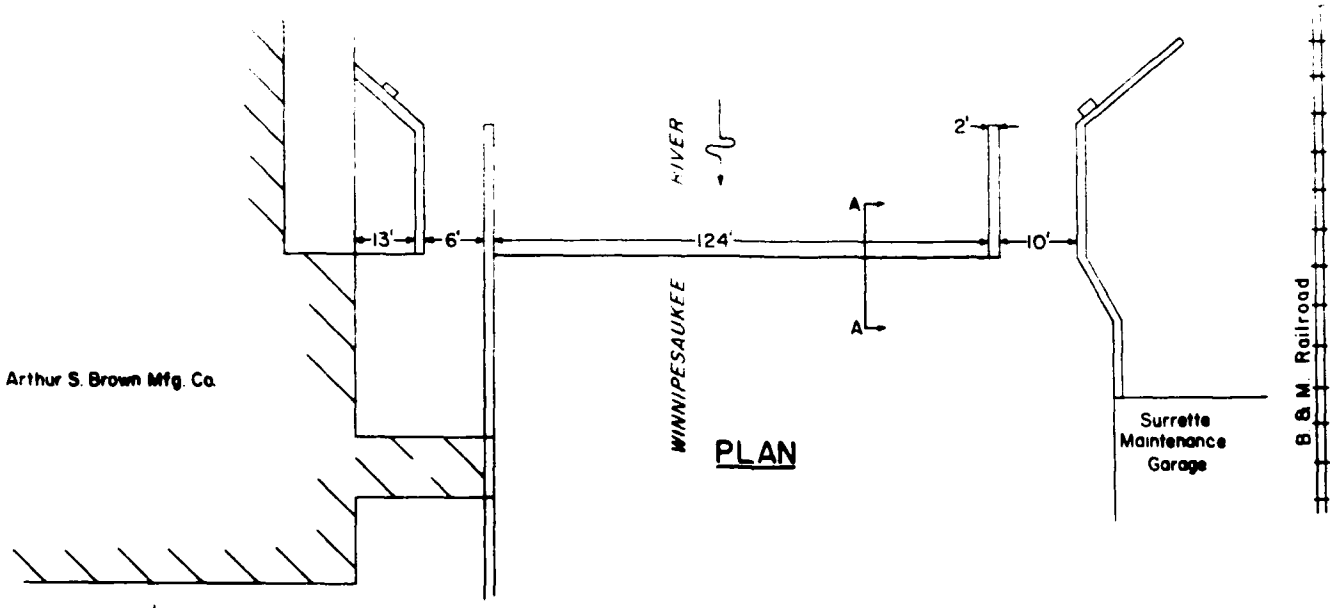
FOR CENTRAL STATIONS		FOR ISOLATED INDUSTRIAL PLANTS		
L. CAPACITY	ANNUAL KW. H. OUTPUT	K. V. A. CAPACITY	ANNUAL KW. H. PROD. AND CONS ELECT.	ANNUAL KW. H. PROD. AND CONS MECH.

PUBLIC SERVICE COMMISSION OF NEW HAMPSHIRE—DAM RECORD 1-3898

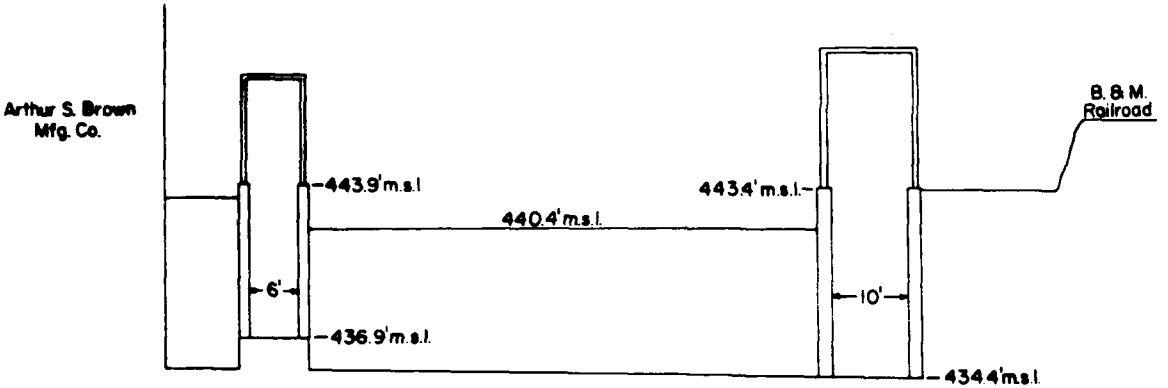
TOWN TILTON	TOWN NO. 2	STATE NO.
RIVER STREAM WINNEPESAUKEE RIVER		
DRAINAGE AREA 4185 SQ. MI.	POND AREA	
DAM TYPE "A" FRAME	FOUNDATION NATURE OF HARDPAN	
MATERIALS OF CONSTRUCTION TIMBER		
PURPOSE OF DAM POWER—CONSERVATION—DOMESTIC—RECREATION—TRANSPORTATION—PUBLIC UTILITY 1/2		
HEIGHTS, TOP OF DAM TO BED OF STREAM 16'	TOP OF DAM TO SPILLWAY CRESTS 4'	
SPILLWAYS, LENGTHS DEPTHS BELOW TOP OF DAM 50' - 37'		LENGTH OF DAM 170'
FLASHBOARDS TYPE, HEIGHT ABOVE CREST NONE		
OPERATING HEAD CREST TO N. T. W. 11'	TOP OF FLASHBOARDS TO N. T. W.	
WHEELS, NUMBER KINDS & H. P. 1- Rodney Hunt 48" 100 HP		
GENERATORS, NUMBER KINDS & K.W. Northern D.C 30KW 240A - 125V		
H. P. 90 P. C. TIME 100 P. C. EFF.	H. P. 75 P. C. TIME 100 P. C. EFF.	
REFERENCES, CASES, PLANS, INSPECTIONS.		
REMARKS old dam is Tilton 2 " " " Northfield 3 Equipment on Tilton plant. Tilton plant could not get any information H.L. 10.5'		

2151

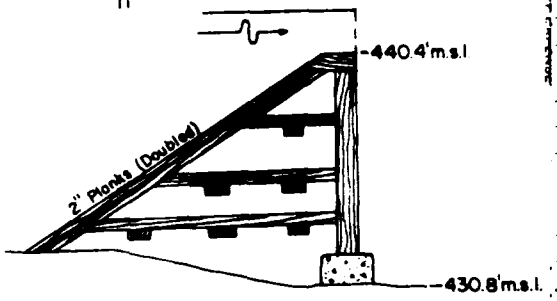
B-22



PLAN



ELEVATION



SECTION A-A

Anderson-Nichols & Co., Inc. CONCORD NEW HAMPSHIRE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

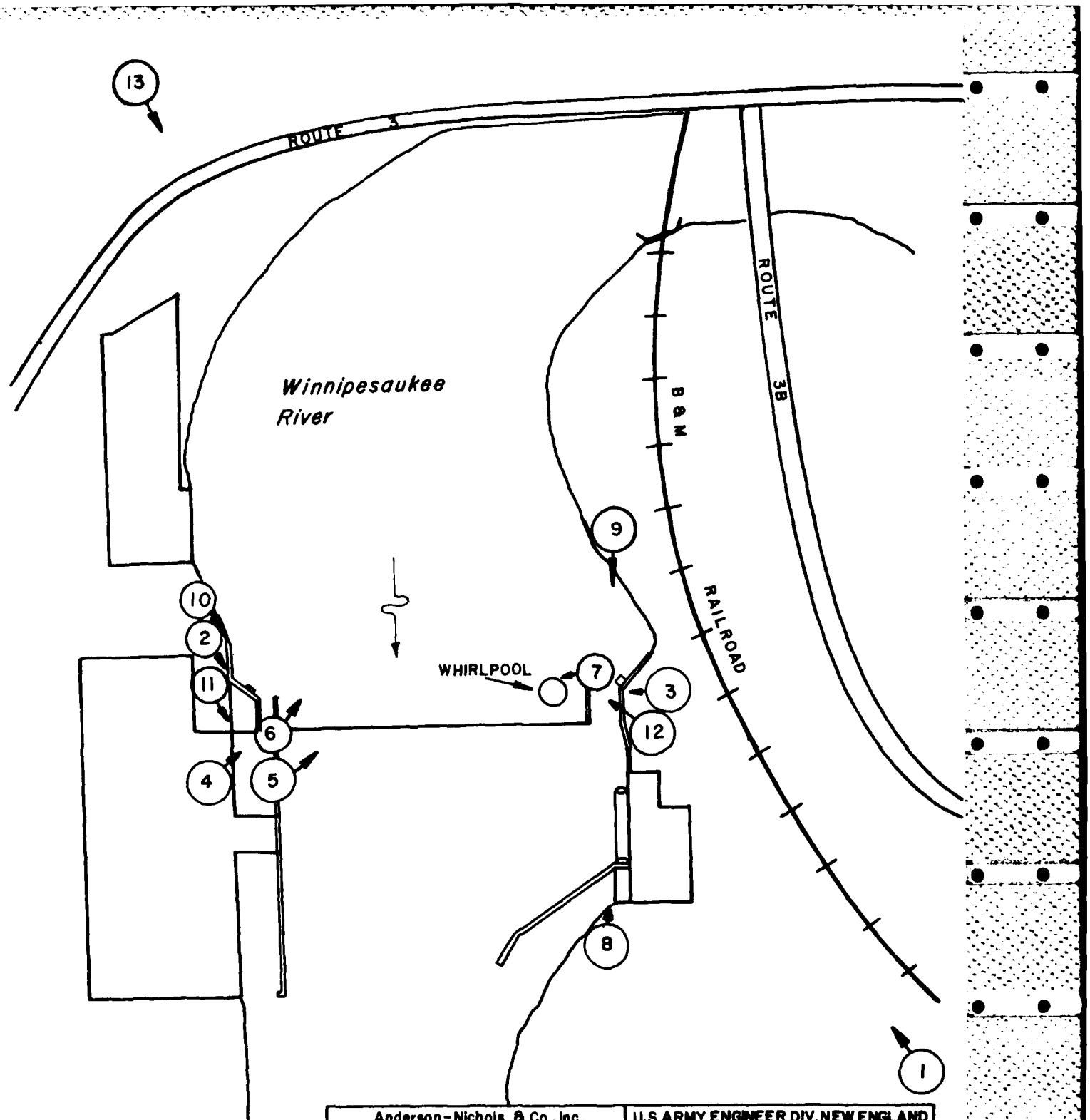
TILTON TOWN DAM

WINNIPESAUKEE RIVER — NEW HAMPSHIRE

SCALE	NOT TO SCALE
DATE	JULY 1979

APPENDIX C

PHOTOGRAPHS



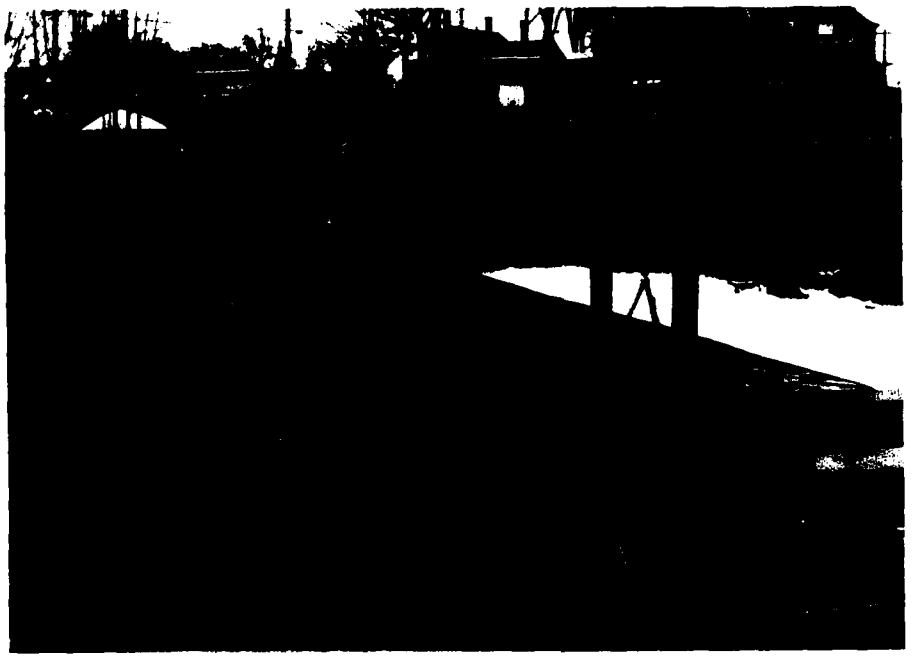
Anderson-Nichols & Co., Inc. CONCORD NEW HAMPSHIRE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

TILTON TOWN DAM
PHOTO INDEX

WINNIPESAUKEE RIVER NEW HAMPSHIRE

SCALE:	NOT TO SCALE
DATE:	JULY, 1979



April 6, 1979

Figure 2 - Looking south across the upstream face of the dam from the north abutment.

April 6, 1979

Figure 3 - Looking north across the upstream face of the dam from the south abutment.

April 6, 1979

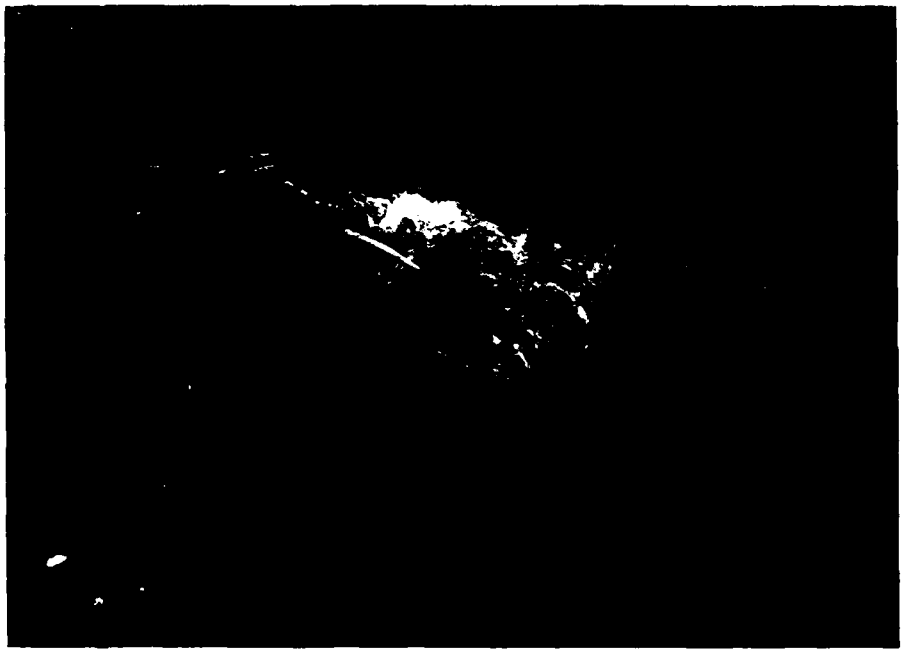
Figure 4 - View of the spillway. Note the uneven level of the water.

April 24, 1979

Figure 5 - Looking at the spillway where local support failures have occurred. Note the water discharging through the spillway through holes in planking.

April 24, 1979

Figure 6 - Closeup of the deteriorated planking on the upspream side of the spillway.

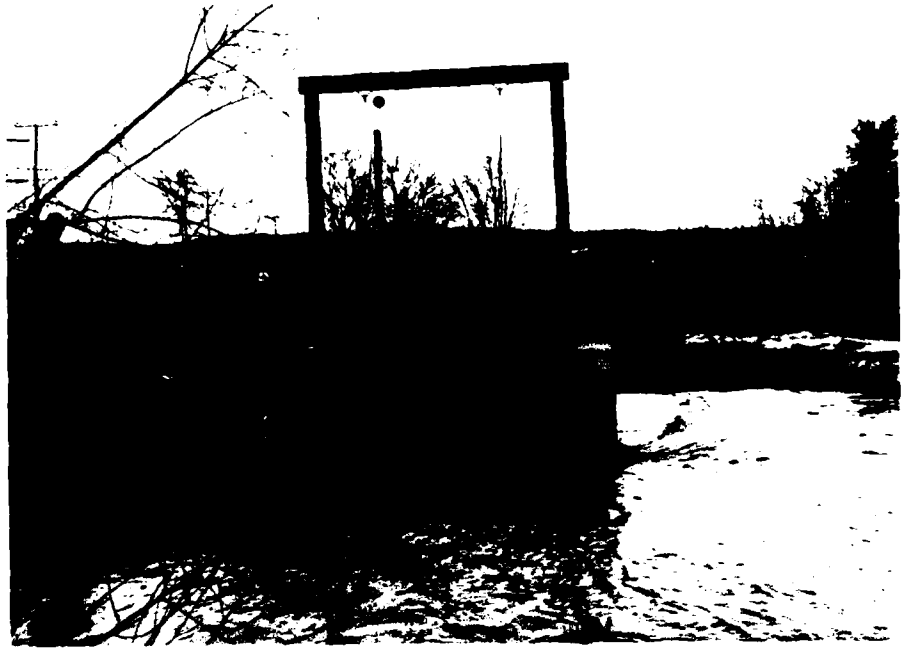


April 24, 1979

Figure 7 - View of the whirlpool located over a hole in the planking.

April 6, 1979

Figure 8 - View of the downstream face of the south abutment.



April 6, 1979

Figure 9 - View of the upstream face of the south abutment. Note the concrete box inlet structure.

April 6, 1979

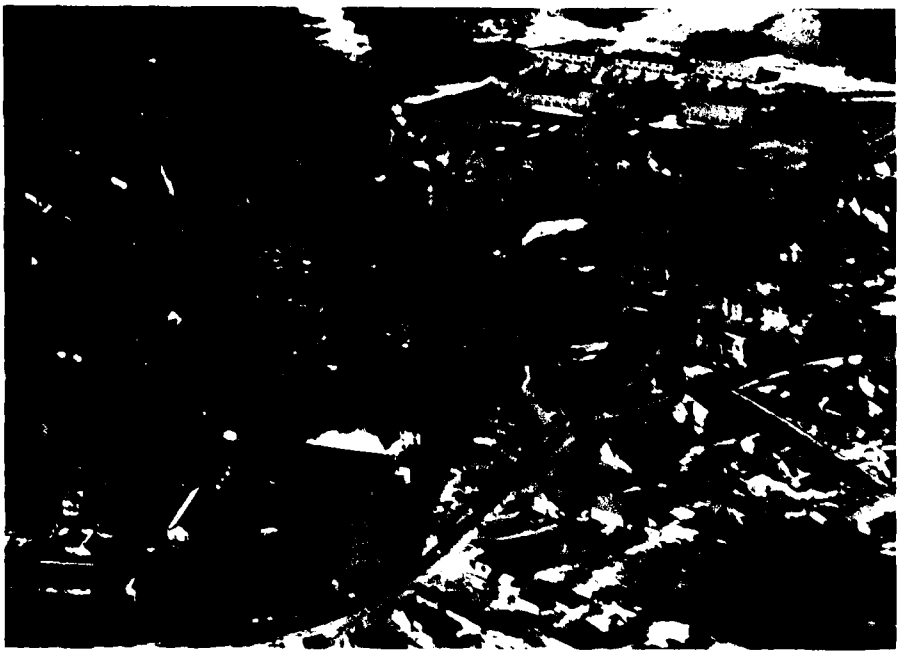
Figure 10 - Looking at the upstream face of the north abutment.

April 6, 1979

Figure 11 - View of the sinkhole observed in the fill at the north abutment.

April 6, 1979

Figure 12 - Looking upstream at the north approach channel from the south abutment.

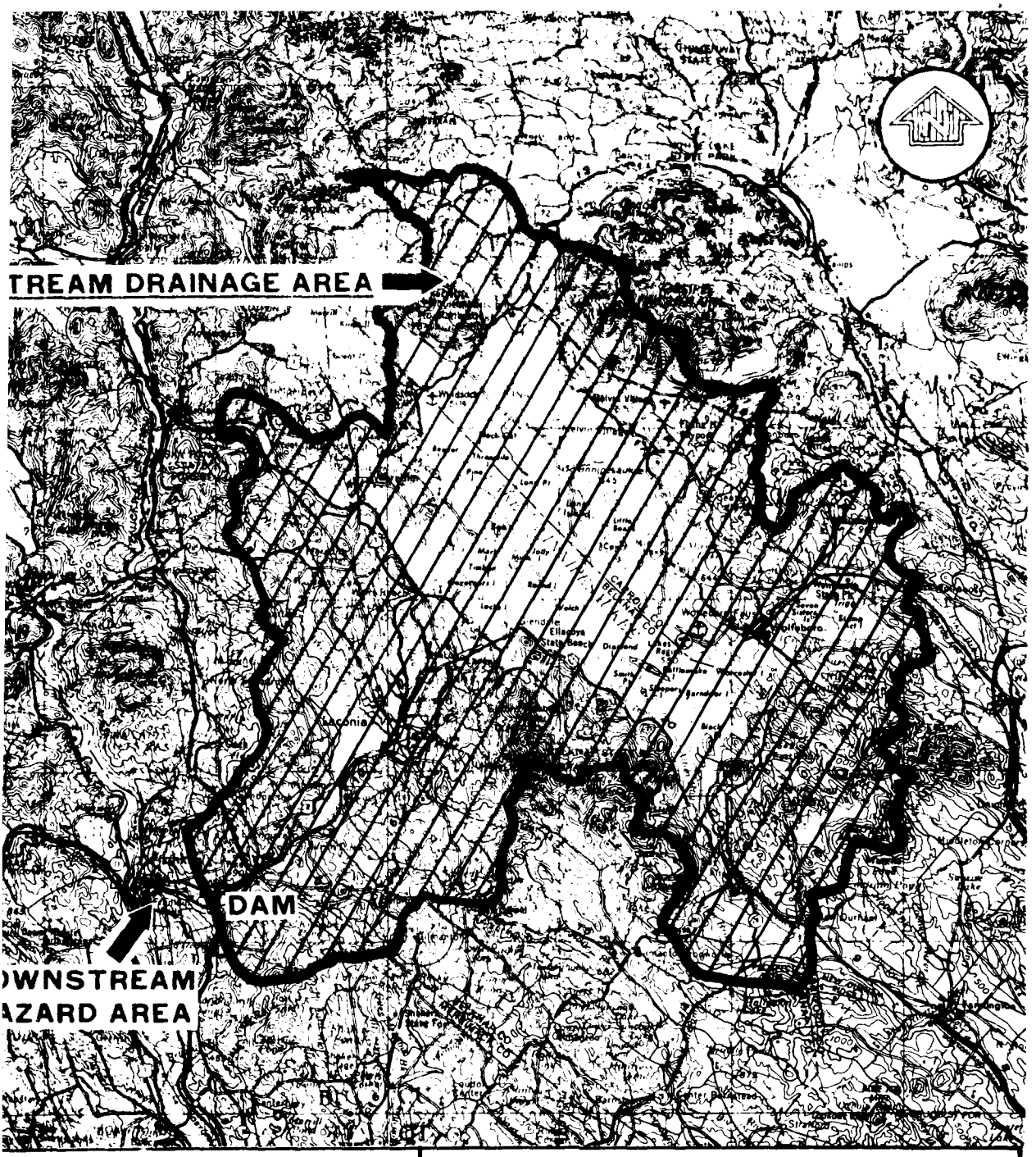


April 1979

Figure 13 - Overview of the downstream channel.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS



ATIONAL PROGRAM OF INSPECTION
OF NON-FED DAMS

TILTON TOWN DAM

TILTON, NEW HAMPSHIRE

EGIONAL VICINITY MAP

DEPARTMENT OF THE ARMY
ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

N-NICHOLS & CO, INC. CONCORD, N H

SCALE IN MILES

0 5 10

MAP BASED ON U.S.G.S. 1:250,000 SERIES TOPOGRAPHIC MAPPING. NK-19-1 PORTLAND ME, NH 1956, REVISED 1972.

TILTON TOWN DAM
DROLOGIC/HYDRAULIC ANALYSIS

L. Williams
4/20/79

a = 473 mi²
ze Classification = Small
zard Classification = Significant
st Flood = ¼ PMF to ½ PMF
osen test flood = ½ PMF

t flood inflow cannot simply be
ermined by use of the PMF guide
ves due to the complexity of
hydrologic and hydraulic conditions
ich comprise the Winnipesaukee
er drainage basin. Flooding on the
ipesaukee River and its associated
s and lakes is to a large extent
trolled by Lochmere Dam on Lake
nisquam, Avery Dam on the Winnipesaukee
er, and Lakeport Dam between Opechee
e and Paugus Bay. Referring to the
thfield and Tilton Flood Insurance
dies, peak discharges on the Winnipesaukee
er were determined at Lakeport Dam,
y Dam, and Lochmere Dam using
ious hydrologic methods. (Note: Northfield
done by ANCO, received backup from
ilton Engineering who performed the
n FIS Study, September 1977.) The
k discharge at the Tilton gage during
500-year storm was determined to
7,570 cfs. This gage is located 0.4
es upstream of Tilton Town Dam. The
harge at Lakeport Dam during a flooding
t of this magnitude was determined to
4,300 cfs.

*	27595.000	1050.00	0.0	0.0	426.83	434.50	420.80	434.20	12.51	7000.00	0.0	7000.00	0.0
*	27595.000	1050.00	0.0	0.0	427.29	434.50	420.80	434.20	13.02	8000.00	0.0	8000.00	0.0
*	27595.000	1050.00	0.0	0.0	427.74	434.50	420.80	434.20	13.47	9000.00	0.0	9000.00	0.0
	27910.000	315.00	0.0	0.0	428.07	444.20	425.80	442.90	5.17	1000.00	0.0	1000.00	0.0
	27910.000	315.00	0.0	0.0	429.52	444.20	425.80	442.90	7.36	3000.00	0.0	3000.00	0.0
	27910.000	315.00	0.0	0.0	430.34	444.20	425.80	442.90	8.35	4475.00	0.0	4475.00	0.0
	27910.000	315.00	0.0	0.0	431.06	444.20	425.80	442.90	9.04	5875.00	0.0	5875.00	0.0
	27910.000	315.00	0.0	0.0	431.60	444.20	425.80	442.90	9.48	7000.00	0.0	7000.00	0.0
	27910.000	315.00	0.0	0.0	432.08	444.20	425.80	442.90	9.80	8000.00	0.0	8000.00	0.0
	27910.000	315.00	0.0	0.0	432.53	444.20	425.80	442.90	10.10	9000.00	0.0	9000.00	0.0

	SECNO	XLCH	ELTRB	ELLC	CWSEL	XLBEL	ELMIN	RBEL	VCH	Q	QLOB	QCH	QROB
*	28010.000	100.00	0.0	0.0	431.92	443.60	430.80	443.20	6.05	1000.00	0.0	1000.00	0.0
*	28010.000	100.00	0.0	0.0	433.13	443.60	430.80	443.20	8.70	3000.00	0.0	3000.00	0.0
*	28010.000	100.00	0.0	0.0	433.85	443.60	430.80	443.20	9.94	4475.00	0.0	4475.00	0.0
*	28010.000	100.00	0.0	0.0	434.45	443.60	430.80	443.20	10.90	5875.00	0.0	5875.00	0.0
*	28010.000	100.00	0.0	0.0	434.90	443.60	430.80	443.20	11.55	7000.00	0.0	7000.00	0.0
*	28010.000	100.00	0.0	0.0	435.30	443.60	430.80	443.20	12.04	8000.00	0.0	8000.00	0.0
*	28010.000	100.00	0.0	0.0	435.66	443.60	430.80	443.20	12.53	9000.00	0.0	9000.00	0.0
*	28015.000	5.00	440.40	434.40	440.99	443.40	434.40	443.90	6.11	1000.00	0.0	992.92	7.07
*	28015.000	5.00	440.40	434.40	442.29	443.40	434.40	443.90	8.52	3000.00	0.0	2941.63	58.37
*	28015.000	5.00	440.40	434.40	443.00	443.40	434.40	443.90	9.80	4475.00	0.0	4356.69	118.31
*	28015.000	5.00	440.40	434.40	443.59	443.40	434.40	443.90	10.76	5875.00	0.37	5683.52	191.12
*	28015.000	5.00	440.40	434.40	444.15	443.40	434.40	443.90	11.05	7000.00	12.73	6713.12	274.15
*	28015.000	5.00	440.40	434.40	444.49	443.40	434.40	443.90	11.60	8000.00	36.25	7616.17	347.58
*	28015.000	5.00	440.40	434.40	444.94	443.40	434.40	443.90	11.74	9000.00	89.44	8476.27	434.28
	28027.000	12.00	0.0	0.0	441.66	452.00	435.10	447.60	2.03	1000.00	0.0	1000.00	0.0
	28027.000	12.00	0.0	0.0	443.43	452.00	435.10	447.60	4.07	3000.00	0.0	3000.00	0.0
	28027.000	12.00	0.0	0.0	444.40	452.00	435.10	447.60	5.10	4475.00	0.0	4475.00	0.0
	28027.000	12.00	0.0	0.0	445.20	452.00	435.10	447.60	5.92	5875.00	0.0	5875.00	0.0
	28027.000	12.00	0.0	0.0	445.70	452.00	435.10	447.60	6.57	7000.00	0.0	7000.00	0.0
	28027.000	12.00	0.0	0.0	446.13	452.00	435.10	447.60	7.08	8000.00	0.0	8000.00	0.0
	28027.000	12.00	0.0	0.0	446.47	452.00	435.10	447.60	7.63	9000.00	0.0	9000.00	0.0
	28071.000	44.00	0.0	0.0	441.73	449.00	432.10	444.60	1.08	1000.00	0.0	1000.00	0.0
	28071.000	44.00	0.0	0.0	443.66	449.00	432.10	444.60	2.48	3000.00	0.0	3000.00	0.0
	28071.000	44.00	0.0	0.0	444.75	449.00	432.10	444.60	3.25	4475.00	0.0	4475.00	0.00
	28071.000	44.00	0.0	0.0	445.64	449.00	432.10	444.60	3.87	5875.00	0.0	5875.00	0.00
	28071.000	44.00	0.0	0.0	446.24	449.00	432.10	444.60	4.34	7000.00	0.0	7000.00	0.00
	28071.000	44.00	0.0	0.0	446.74	449.00	432.10	444.60	4.73	8000.00	0.0	8000.00	0.00
	28071.000	44.00	0.0	0.0	447.17	449.00	432.10	444.60	5.11	9000.00	0.0	8999.99	0.01
	28525.000	454.00	0.0	0.0	441.77	443.20	433.90	445.00	1.59	1000.00	0.02	999.98	0.0
	28525.000	454.00	0.0	0.0	443.80	443.20	433.90	445.00	3.40	3000.00	21.85	2978.15	0.0
	28525.000	454.00	0.0	0.0	444.94	443.20	433.90	445.00	4.31	4475.00	71.94	4403.05	0.0
	28525.000	454.00	0.0	0.0	445.87	443.20	433.90	445.00	5.03	5875.00	136.07	5737.52	1.40
	28525.000	454.00	0.0	0.0	446.50	443.20	433.90	445.00	5.57	7000.00	193.56	6800.14	6.30
	28525.000	454.00	0.0	0.0	447.03	443.20	433.90	445.00	6.00	8000.00	249.93	7734.07	16.00
	28525.000	454.00	0.0	0.0	447.48	443.20	433.90	445.00	6.43	9000.00	307.57	8664.00	28.42

TILTON TOWN DAM

16245.000	1455.00	0.0	0.0	411.82	402.00	394.30	402.00	2.76	9000.00	1159.11	6812.57	1028.32
18030.000	1785.00	0.0	0.0	403.14	404.00	399.60	404.00	3.70	1000.00	0.0	1000.00	0.0
18030.000	1785.00	0.0	0.0	406.54	404.00	399.60	404.00	4.84	3000.00	30.28	2948.82	20.89
18030.000	1785.00	0.0	0.0	408.32	404.00	399.60	404.00	5.49	4475.00	92.38	4315.66	66.96
18030.000	1785.00	0.0	0.0	409.80	404.00	399.60	404.00	5.97	5875.00	170.11	5577.41	127.48
18030.000	1785.00	0.0	0.0	410.84	404.00	399.60	404.00	6.31	7000.00	247.77	6561.96	190.27
18030.000	1785.00	0.0	0.0	411.69	404.00	399.60	404.00	6.60	8000.00	328.97	7416.08	254.95
18030.000	1785.00	0.0	0.0	412.50	404.00	399.60	404.00	6.84	9000.00	423.96	8247.28	328.76
18620.000	590.00	0.0	0.0	404.64	409.00	400.00	409.20	4.09	1000.00	0.0	1000.00	0.0
18620.000	590.00	0.0	0.0	407.52	409.00	400.00	409.20	4.63	3000.00	0.0	3000.00	0.0
18620.000	590.00	0.0	0.0	409.23	409.00	400.00	409.20	4.60	4475.00	0.03	4474.97	0.00
18620.000	590.00	0.0	0.0	410.66	409.00	400.00	409.20	4.63	5875.00	4.48	5863.09	7.43
18620.000	590.00	0.0	0.0	411.71	409.00	400.00	409.20	4.70	7000.00	15.50	6952.74	31.76
18620.000	590.00	0.0	0.0	412.57	409.00	400.00	409.20	4.77	8000.00	32.57	7903.73	63.70
18620.000	590.00	0.0	0.0	413.39	409.00	400.00	409.20	4.85	9000.00	52.65	8844.77	102.58
20515.000	1895.00	0.0	0.0	405.51	411.00	400.80	411.40	1.32	1000.00	0.0	1000.00	0.0
20515.000	1895.00	0.0	0.0	408.46	411.00	400.80	411.40	1.97	3000.00	0.0	3000.00	0.0
20515.000	1895.00	0.0	0.0	410.12	411.00	400.80	411.40	2.23	4475.00	0.01	4474.98	0.0
20515.000	1895.00	0.0	0.0	411.50	411.00	400.80	411.40	2.40	5875.00	16.86	5858.14	0.00
20515.000	1895.00	0.0	0.0	412.50	411.00	400.80	411.40	2.50	7000.00	108.62	6891.23	0.15
20515.000	1895.00	0.0	0.0	413.33	411.00	400.80	411.40	2.56	8000.00	280.23	7719.11	0.66
20515.000	1895.00	0.0	0.0	414.12	411.00	400.80	411.40	2.59	9000.00	518.85	8479.54	1.60

SECNO	XLCH	ELTRD	ELLC	CWSEL	XLBEL	ELMIN	RBEL	VCH	Q	QLOB	QCH	QROB
21425.000	910.00	0.0	0.0	405.79	407.60	400.40	407.00	2.50	1000.00	0.0	1000.00	0.0
21425.000	910.00	0.0	0.0	408.71	407.60	400.40	407.00	3.82	3000.00	0.12	2996.22	3.66
21425.000	910.00	0.0	0.0	410.34	407.60	400.40	407.00	4.40	4475.00	1.28	4424.37	49.35
21425.000	910.00	0.0	0.0	411.68	407.60	400.40	407.00	4.83	5875.00	3.64	5738.75	132.61
21425.000	910.00	0.0	0.0	412.66	407.60	400.40	407.00	5.12	7000.00	10.33	6761.70	227.97
21425.000	910.00	0.0	0.0	413.46	407.60	400.40	407.00	5.32	8000.00	40.98	7616.26	342.76
21425.000	910.00	0.0	0.0	414.24	407.60	400.40	407.00	5.46	9000.00	126.82	8395.26	477.92
21965.000	540.00	0.0	0.0	406.09	413.60	401.20	413.70	2.61	1000.00	0.0	1000.00	0.0
21965.000	540.00	0.0	0.0	409.04	413.60	401.20	413.70	3.92	3000.00	0.0	3000.00	0.0
21965.000	540.00	0.0	0.0	410.65	413.60	401.20	413.70	4.52	4475.00	0.0	4475.00	0.0
21965.000	540.00	0.0	0.0	411.99	413.60	401.20	413.70	4.96	5875.00	0.0	5875.00	0.0
21965.000	540.00	0.0	0.0	412.95	413.60	401.20	413.70	5.26	7000.00	0.0	7000.00	0.0
21965.000	540.00	0.0	0.0	413.74	413.60	401.20	413.70	5.51	8000.00	0.01	7999.99	0.00
21965.000	540.00	0.0	0.0	414.50	413.60	401.20	413.70	5.74	9000.00	1.07	8998.87	0.06
23220.000	1255.00	0.0	0.0	406.77	415.60	401.00	414.00	1.89	1000.00	0.0	1000.00	0.0
23220.000	1255.00	0.0	0.0	409.83	415.60	401.00	414.00	2.82	3000.00	0.0	3000.00	0.0
23220.000	1255.00	0.0	0.0	411.50	415.60	401.00	414.00	3.25	4475.00	0.0	4475.00	0.0
23220.000	1255.00	0.0	0.0	412.88	415.60	401.00	414.00	3.57	5875.00	0.0	5875.00	0.0
23220.000	1255.00	0.0	0.0	413.87	415.60	401.00	414.00	3.80	7000.00	0.0	6999.14	0.86
23220.000	1255.00	0.0	0.0	414.68	415.60	401.00	414.00	3.97	8000.00	0.0	7985.40	14.59
23220.000	1255.00	0.0	0.0	415.45	415.60	401.00	414.00	4.10	9000.00	0.0	8898.31	101.70
25615.000	2395.00	0.0	0.0	409.15	410.00	404.80	410.30	3.56	1000.00	0.0	1000.00	0.0
25615.000	2395.00	0.0	0.0	412.04	410.00	404.80	410.30	5.14	3000.00	1.23	2986.49	12.29
25615.000	2395.00	0.0	0.0	413.55	410.00	404.80	410.30	5.86	4475.00	5.21	4342.39	127.40
25615.000	2395.00	0.0	0.0	414.77	410.00	404.80	410.30	6.31	5875.00	11.09	5491.60	372.31
25615.000	2395.00	0.0	0.0	415.67	410.00	404.80	410.30	6.60	7000.00	17.14	6371.37	611.49
25615.000	2395.00	0.0	0.0	416.41	410.00	404.80	410.30	6.84	8000.00	23.36	7134.20	842.44
25615.000	2395.00	0.0	0.0	417.10	410.00	404.80	410.30	7.06	9000.00	30.31	7884.79	1084.90
26545.000	930.00	0.0	0.0	411.90	412.90	408.20	413.40	4.28	1000.00	0.0	1000.00	0.0

X1	28010.000	13.000	1048.000	1196.000	85.000	130.000	100.000	0.0	0.0	0.0
GR	453.300	980.000	452.400	1000.000	444.400	1010.000	443.600	1048.000	430.800	1048.100
GR	430.800	1195.900	443.200	1196.000	444.100	1208.000	446.500	1208.100	442.900	1216.000
GR	439.800	1216.100	439.400	1228.000	450.000	1228.100	0.0	0.0	0.0	0.0
SB	0.900	10.000	3.000	0.0	0.100	0.010	0.010	0.0	434.400	430.800

TILTON TOWN CAM

X1	28015.000	17.000	932.000	1076.100	5.000	5.000	5.000	0.0	0.0	0.0
X2	0.0	0.0	1.000	434.400	440.400	0.0	0.0	0.0	0.0	0.0
BT	17.000	864.000	453.300	0.0	884.000	452.400	0.0	894.000	444.400	0.0
BT	932.000	443.400	0.0	932.100	434.400	0.0	942.000	434.400	0.0	942.100
BT	443.400	0.0	944.000	443.400	0.0	944.100	440.400	0.0	1068.000	440.400
BT	0.0	1068.100	443.900	0.0	1070.000	443.900	0.0	1070.100	436.900	0.0
BT	1076.000	436.900	0.0	1076.100	443.900	0.0	1108.000	440.000	0.0	1108.100
BT	450.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	453.300	864.000	452.400	884.000	444.400	894.000	443.400	932.000	434.400	932.100
GR	434.400	942.000	443.400	942.100	443.400	944.000	440.400	944.100	440.400	1068.000
GR	443.900	1068.100	443.900	1070.000	436.900	1070.100	436.900	1076.000	443.900	1076.100
GR	440.000	1108.000	450.000	1108.100	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.300	0.500	0.0	0.0	0.0	0.0	0.0

D-14

X1	28027.000	17.000	1006.000	1173.000	12.000	12.000	12.000	0.0	3.000	0.0
GR	453.100	965.000	452.200	984.000	449.600	1000.000	449.000	1006.000	442.100	1025.000
GR	440.800	1027.000	437.300	1035.000	436.800	1063.000	433.800	1086.000	434.800	1103.000
GR	432.100	1126.000	435.300	1148.000	434.800	1164.000	437.700	1167.000	444.600	1173.000
GR	447.400	1173.100	448.100	1190.000	0.0	0.0	0.0	0.0	0.0	0.0

X1	28071.000	0.0	0.0	0.0	60.000	70.000	44.000	0.0	-3.000	0.0
NC	0.080	0.0	0.035	0.300	0.500	0.0	0.0	0.0	0.0	0.0

X1	28525.000	25.000	1051.000	1179.000	360.000	520.000	454.000	0.0	0.0	0.0
GR	465.900	521.000	463.700	587.000	462.800	619.000	461.500	666.000	460.600	696.000
GR	455.800	815.000	451.700	858.000	451.400	967.000	451.800	982.000	451.100	1000.000
GR	450.600	1003.000	441.800	1018.000	441.600	1025.000	443.000	1033.000	443.200	1051.000
GR	440.900	1063.000	438.800	1070.000	433.900	1094.000	436.200	1112.000	434.900	1140.000
GR	435.900	1164.000	440.900	1174.000	445.000	1179.000	446.600	1200.000	448.800	1206.000
EJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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SUMMARY PRINTOUT

SECNO	XLCH	ELTRD	ELLC	CWSEL	XLBEL	ELMIN	RBEL	VCH	Q	QLOB	QCH	QROB
14790.000	220.00	0.0	0.0	400.97	405.20	394.50	405.10	1.96	1000.00	0.0	1000.00	0.0
14790.000	220.00	0.0	0.0	405.16	405.20	394.50	405.10	2.74	3000.00	0.0	3000.00	0.00
14790.000	220.00	0.0	0.0	407.03	405.20	394.50	405.10	3.22	4475.00	3.57	4468.82	2.61
14790.000	220.00	0.0	0.0	408.57	405.20	394.50	405.10	3.57	5875.00	31.26	5831.25	12.48
14790.000	220.00	0.0	0.0	409.65	405.20	394.50	405.10	3.80	7000.00	101.72	6872.66	25.61
14790.000	220.00	0.0	0.0	410.51	405.20	394.50	405.10	3.99	8000.00	193.78	7765.47	40.76
14790.000	220.00	0.0	0.0	411.35	405.20	394.50	405.10	4.15	9000.00	314.35	8624.16	61.50
16245.000	1455.00	0.0	0.0	401.32	402.00	394.30	402.00	1.43	1000.00	0.0	1000.00	0.0
16245.000	1455.00	0.0	0.0	405.51	402.00	394.30	402.00	1.96	3000.00	150.74	2753.25	96.01

NC	0.110	0.110	0.030	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	20515.000	33.000	9638.000	9958.000	1720.000	1840.000	1895.000	0.0	0.0	0.0
GR	420.900	8497.000	419.300	8536.000	413.900	8565.000	412.500	8639.000	413.800	8746.000
GR	411.600	8885.000	414.900	8896.000	416.100	8992.000	415.600	9021.000	410.700	9051.000
GR	411.000	9086.000	412.500	9103.000	410.000	9176.000	411.000	9213.000	411.400	9307.000
GR	411.900	9403.000	412.100	9461.000	411.800	9513.000	412.300	9542.000	411.000	9638.000
GR	405.300	9681.000	403.100	9699.000	402.700	9716.000	403.900	9734.000	403.500	9741.000
GR	402.000	9788.000	400.800	9822.000	401.300	9864.000	402.000	9899.000	405.300	9921.000
GR	408.400	9935.000	411.400	9958.000	423.100	9987.000	0.0	0.0	0.0	0.0
X1	21425.000	38.000	9864.000	10000.000	700.000	1680.000	910.000	0.0	0.0	0.0
GR	420.300	8700.000	417.400	8712.000	413.400	8727.000	414.600	8792.000	415.300	8853.000
GR	413.300	8872.000	413.200	8945.000	411.900	8965.000	413.000	9043.000	417.700	9131.000
GR	417.700	9267.000	417.900	9363.000	416.700	9450.000	416.400	9523.000	414.600	9610.000
GR	413.200	9643.000	414.900	9738.000	415.100	9833.000	413.200	9858.000	407.600	9864.000
GR	405.600	9876.000	401.800	9889.000	400.400	9913.000	401.100	9931.000	402.200	9949.000
GR	402.900	9962.000	405.600	9996.000	407.000	10000.000	408.700	10010.000	408.800	10025.000
GR	408.000	10032.000	412.200	10111.000	412.700	10160.000	416.100	10263.000	414.200	10275.000
GR	418.000	10357.000	419.000	10365.000	423.000	10375.000	0.0	0.0	0.0	0.0
X1	21965.000	21.000	848.000	1002.000	250.000	440.000	540.000	0.0	0.0	0.0
GR	419.700	375.000	417.300	450.000	415.200	483.000	416.000	545.000	416.100	593.000
GR	415.800	645.000	417.500	704.000	416.200	813.000	413.600	848.000	411.200	853.000
GR	406.000	866.000	404.000	875.000	404.600	888.000	403.800	903.000	401.200	934.000
GR	401.200	960.000	402.400	973.000	406.000	988.000	411.800	1000.000	413.700	1002.000
GR	424.600	1015.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.100	0.110	0.035	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	23220.000	20.000	783.000	990.000	1000.000	880.000	1255.000	0.0	0.0	0.0
GR	419.800	776.000	415.600	783.000	408.100	796.000	407.000	799.000	404.700	819.000
GR	403.500	847.000	401.000	876.000	402.600	904.000	403.600	934.000	404.900	951.000
GR	407.000	966.000	414.000	990.000	414.400	1000.000	414.500	1084.000	414.400	1183.000
GR	414.500	1265.000	417.400	1335.000	415.200	1438.000	413.200	1468.000	419.800	1555.000
X1	25615.000	19.000	884.000	990.000	2600.000	720.000	2395.000	0.0	0.0	0.0
GR	420.900	871.000	410.000	884.000	408.700	887.000	407.200	893.000	404.800	907.000
GR	405.100	917.000	404.800	935.000	405.800	950.000	407.300	967.000	408.700	975.000
GR	410.300	990.000	411.200	1000.000	413.200	1055.000	413.200	1092.000	411.500	1105.000
GR	413.100	1159.000	415.700	1167.000	419.900	1185.000	420.900	1197.000	0.0	0.0
NC	0.085	0.110	0.040	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	26545.000	31.000	886.000	992.000	600.000	480.000	930.000	0.0	0.0	0.0
GR	434.700	752.000	415.400	788.000	415.400	811.000	414.200	830.000	414.600	869.000
GR	412.900	886.000	411.300	889.000	408.200	900.000	408.800	918.000	409.800	933.000
GR	409.700	957.000	409.700	965.000	410.500	987.000	412.100	988.000	413.400	992.000
GR	416.800	995.000	417.100	1000.000	419.000	1052.000	418.600	1066.000	417.300	1093.000
GR	416.900	1116.000	420.100	1144.000	422.900	1201.000	421.600	1243.000	423.200	1283.000
GR	423.200	1291.000	420.400	1395.000	420.500	1531.000	419.900	1643.000	418.400	1656.000
GR	424.800	1683.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.085	0.0	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	27595.000	14.000	855.000	1000.000	800.000	1320.000	1050.000	0.0	0.0	0.0
GR	440.600	816.000	440.200	848.000	434.500	855.000	423.500	870.000	421.300	890.000
GR	421.100	899.000	420.800	918.000	421.700	946.000	421.600	958.000	423.000	971.000
GR	423.500	974.000	434.200	1000.000	437.400	1114.000	443.400	1166.000	0.0	0.0

Test File
Both Gates Open

T1 CORPS OF ENGINEERS NEW ENGLAND DIVISION-TILTON TOWN DAM
T2 ANDERSON-NICHOLS & CO. INC.
T3 WINNIPESAUKEE RIVER RATING CURVE DATA

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	-1.	2.	0.	0.	0.000320	0.0	0.0	0.	404.000	0.0
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	1.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
J3	VARIABLE CODES FOR SUMMARY PRINTOUT									
	38.000	39.000	40.000	41.000	1.000	23.000	42.000	24.000	26.000	43.000
	13.000	14.000	15.000	0.0	38.000	1.000	50.000	61.000	51.000	53.000
	21.000	4.000	22.000	54.000	49.000	34.000	17.000	0.0	0.0	0.0
J6	IHLEQ	ICOPY								
	1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

QT	7.000	1000.000	3000.000	4475.000	5875.000	7000.000	8000.000	9000.000	0.0	0.0
NC	0.090	0.090	0.035	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	14790.000	18.000	841.000	1000.000	150.000	250.000	220.000	0.0	0.0	0.0
GR	421.500	501.000	420.200	617.000	411.800	620.000	407.900	761.000	407.800	821.000
GR	405.200	841.000	401.500	857.000	397.500	868.000	396.400	889.000	394.500	910.000
GR	396.100	929.000	396.700	952.000	398.400	973.000	401.500	981.000	405.100	1000.000
GR	411.000	1029.000	416.700	1041.000	421.500	1049.000	0.0	0.0	0.0	0.0
X1	16245.000	23.000	9812.000	9981.000	1320.000	1520.000	1455.000	0.0	0.0	0.0
GR	422.600	9078.000	418.400	9093.000	414.800	9193.000	415.100	9273.000	412.600	9428.000
GR	410.800	9489.000	407.900	9555.000	408.400	9686.000	407.000	9695.000	402.300	9712.000
GR	402.100	9730.000	402.000	9812.000	398.300	9849.000	396.800	9882.000	395.000	9910.000
GR	394.300	9934.000	396.400	9964.000	402.000	9981.000	403.100	10022.000	403.700	10075.000
GR	405.100	10142.000	410.000	10168.000	420.200	10183.000	0.0	0.0	0.0	0.0
X1	18030.000	15.000	950.000	1050.000	1600.000	2240.000	1785.000	0.0	0.0	0.0
GR	425.000	750.000	420.000	780.000	415.000	830.000	410.000	915.000	405.000	935.000
GR	404.000	950.000	401.000	955.000	399.600	1000.000	400.700	1045.000	404.000	1050.000
GR	405.000	1060.000	410.000	1080.000	415.000	1130.000	420.000	1155.000	425.000	1265.000
X1	18620.000	14.000	795.000	1000.000	560.000	520.000	590.000	0.0	0.0	0.0
GR	421.300	727.000	417.200	743.000	414.300	772.000	411.600	777.000	409.000	795.000

	SECNO	XLCH	ELTRD	ELLC	CWSEL	XLBEL	ELMIN	RBEL	VCH	Q	QLOB	QCH	QROB
*	27595.000	1050.00	0.0	0.0	426.26	434.50	420.80	434.20	11.88	5875.00	0.0	5875.00	0.0
*	27595.000	1050.00	0.0	0.0	426.83	434.50	420.80	434.20	12.51	7000.00	0.0	7000.00	0.0
*	27595.000	1050.00	0.0	0.0	427.29	434.50	420.80	434.20	13.02	8000.00	0.0	8000.00	0.0
*	27595.000	1050.00	0.0	0.0	427.74	434.50	420.80	434.20	13.47	9000.00	0.0	9000.00	0.0
	27910.000	315.00	0.0	0.0	428.07	444.20	425.80	442.90	5.17	1000.00	0.0	1000.00	0.0
	27910.000	315.00	0.0	0.0	429.52	444.20	425.80	442.90	7.36	3000.00	0.0	3000.00	0.0
	27910.000	315.00	0.0	0.0	430.34	444.20	425.80	442.90	8.35	4475.00	0.0	4475.00	0.0
	27910.000	315.00	0.0	0.0	431.06	444.20	425.80	442.90	9.04	5875.00	0.0	5875.00	0.0
	27910.000	315.00	0.0	0.0	431.60	444.20	425.80	442.90	9.48	7000.00	0.0	7000.00	0.0
	27910.000	315.00	0.0	0.0	432.08	444.20	425.80	442.90	9.80	8000.00	0.0	8000.00	0.0
	27910.000	315.00	0.0	0.0	432.53	444.20	425.80	442.90	10.10	9000.00	0.0	9000.00	0.0
*	28010.000	100.00	0.0	0.0	431.92	443.60	430.80	443.20	6.05	1000.00	0.0	1000.00	0.0
*	28010.000	100.00	0.0	0.0	433.13	443.60	430.80	443.20	8.70	3000.00	0.0	3000.00	0.0
*	28010.000	100.00	0.0	0.0	433.85	443.60	430.80	443.20	9.94	4475.00	0.0	4475.00	0.0
*	28010.000	100.00	0.0	0.0	434.45	443.60	430.80	443.20	10.90	5875.00	0.0	5875.00	0.0
*	28010.000	100.00	0.0	0.0	434.90	443.60	430.80	443.20	11.55	7000.00	0.0	7000.00	0.0
*	28010.000	100.00	0.0	0.0	435.30	443.60	430.80	443.20	12.04	8000.00	0.0	8000.00	0.0
*	28010.000	100.00	0.0	0.0	435.66	443.60	430.80	443.20	12.53	9000.00	0.0	9000.00	0.0
	28015.000	5.00	440.40	434.40	442.10	443.40	434.40	443.90	3.08	1000.00	0.0	982.34	17.66
	28015.000	5.00	440.40	434.40	443.65	443.40	434.40	443.90	5.40	3000.00	0.38	2900.30	99.32
	28015.000	5.00	440.40	434.40	444.30	443.40	434.40	443.90	6.78	4475.00	12.81	4277.59	184.60
	28015.000	5.00	440.40	434.40	444.83	443.40	434.40	443.90	7.84	5875.00	51.00	5546.42	277.58
	28015.000	5.00	440.40	434.40	445.21	443.40	434.40	443.90	8.59	7000.00	94.41	6549.54	356.05
	28015.000	5.00	440.40	434.40	445.58	443.40	434.40	443.90	9.13	8000.00	143.23	7426.55	430.22
	28015.000	5.00	440.40	434.40	445.86	443.40	434.40	443.90	9.73	9000.00	191.40	8306.23	502.37
	28027.000	12.00	0.0	0.0	442.24	452.00	435.10	447.60	1.75	1000.00	0.0	1000.00	0.0
	28027.000	12.00	0.0	0.0	443.96	452.00	435.10	447.60	3.68	3000.00	0.0	3000.00	0.0
	28027.000	12.00	0.0	0.0	444.76	452.00	435.10	447.60	4.82	4475.00	0.0	4475.00	0.0
	28027.000	12.00	0.0	0.0	445.38	452.00	435.10	447.60	5.76	5875.00	0.0	5875.00	0.0
	28027.000	12.00	0.0	0.0	445.82	452.00	435.10	447.60	6.45	7000.00	0.0	7000.00	0.0
	28027.000	12.00	0.0	0.0	446.21	452.00	435.10	447.60	6.99	8000.00	0.0	8000.00	0.0
	28027.000	12.00	0.0	0.0	446.54	452.00	435.10	447.60	7.55	9000.00	0.0	9000.00	0.0
	28071.000	44.00	0.0	0.0	442.28	449.00	432.10	444.60	0.99	1000.00	0.0	1000.00	0.0
	28071.000	44.00	0.0	0.0	444.14	449.00	432.10	444.60	2.34	3000.00	0.0	3000.00	0.0
	28071.000	44.00	0.0	0.0	445.05	449.00	432.10	444.60	3.14	4475.00	0.0	4475.00	0.00
	28071.000	44.00	0.0	0.0	445.79	449.00	432.10	444.60	3.81	5875.00	0.0	5875.00	0.00
	28071.000	44.00	0.0	0.0	446.33	449.00	432.10	444.60	4.30	7000.00	0.0	7000.00	0.00
	28071.000	44.00	0.0	0.0	446.80	449.00	432.10	444.60	4.70	8000.00	0.0	8000.00	0.00
	28071.000	44.00	0.0	0.0	447.22	449.00	432.10	444.60	5.08	9000.00	0.0	8999.99	0.01
	28525.000	454.00	0.0	0.0	442.31	443.20	433.90	445.00	1.44	1000.00	0.78	999.22	0.0
	28525.000	454.00	0.0	0.0	444.26	443.20	433.90	445.00	3.18	3000.00	32.19	2967.81	0.0
	28525.000	454.00	0.0	0.0	445.22	443.20	433.90	445.00	4.15	4475.00	81.82	4393.14	0.03
	28525.000	454.00	0.0	0.0	446.01	443.20	433.90	445.00	4.95	5875.00	142.08	5730.89	2.03
	28525.000	454.00	0.0	0.0	446.58	443.20	433.90	445.00	5.51	7000.00	197.77	6795.02	7.21
	28525.000	454.00	0.0	0.0	447.08	443.20	433.90	445.00	5.96	8000.00	252.86	7730.07	17.07
	28525.000	454.00	0.0	0.0	447.53	443.20	433.90	445.00	6.40	9000.00	310.27	8660.15	29.58

TILTON DAM TOWN

IPES...
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18620.000	590.00	0.0	0.0	404.64	409.00	400.00	409.20	4.09	1000.00	0.0	1000.00	0.0
18620.000	590.00	0.0	0.0	407.52	409.00	400.00	409.20	4.63	3000.00	0.0	3000.00	0.0
18620.000	590.00	0.0	0.0	409.23	409.00	400.00	409.20	4.60	4475.00	0.03	4474.97	0.00
18620.000	590.00	0.0	0.0	410.66	409.00	400.00	409.20	4.63	5875.00	4.48	5863.09	7.43
18620.000	590.00	0.0	0.0	411.71	409.00	400.00	409.20	4.70	7000.00	15.50	6952.74	31.76
18620.000	590.00	0.0	0.0	412.57	409.00	400.00	409.20	4.77	8000.00	32.57	7903.73	63.70
18620.000	590.00	0.0	0.0	413.39	409.00	400.00	409.20	4.85	9000.00	52.65	8844.77	102.58
20515.000	1895.00	0.0	0.0	405.51	411.00	400.80	411.40	1.32	1000.00	0.0	1000.00	0.0
20515.000	1895.00	0.0	0.0	408.46	411.00	400.80	411.40	1.97	3000.00	0.0	3000.00	0.0
20515.000	1895.00	0.0	0.0	410.12	411.00	400.80	411.40	2.23	4475.00	0.01	4474.98	0.0
20515.000	1895.00	0.0	0.0	411.50	411.00	400.80	411.40	2.40	5875.00	16.86	5858.14	0.00
20515.000	1895.00	0.0	0.0	412.50	411.00	400.80	411.40	2.50	7000.00	108.62	6891.23	0.15
20515.000	1895.00	0.0	0.0	413.33	411.00	400.80	411.40	2.56	8000.00	280.23	7719.11	0.66
20515.000	1895.00	0.0	0.0	414.12	411.00	400.80	411.40	2.59	9000.00	518.85	8479.54	1.60

SECNO	XLCH	ELTRB	ELLC	CWSEL	XLBEL	ELMIN	RBEL	VCH	Q	QLOB	QCH	QROB
21425.000	910.00	0.0	0.0	405.79	407.60	400.40	407.00	2.50	1000.00	0.0	1000.00	0.0
21425.000	910.00	0.0	0.0	408.71	407.60	400.40	407.00	3.82	3000.00	0.12	2996.22	3.66
21425.000	910.00	0.0	0.0	410.34	407.60	400.40	407.00	4.40	4475.00	1.28	4424.37	49.35
21425.000	910.00	0.0	0.0	411.68	407.60	400.40	407.00	4.83	5875.00	3.64	5738.75	132.61
21425.000	910.00	0.0	0.0	412.66	407.60	400.40	407.00	5.12	7000.00	10.33	6761.70	227.97
21425.000	910.00	0.0	0.0	413.46	407.60	400.40	407.00	5.32	8000.00	40.98	7616.26	342.76
21425.000	910.00	0.0	0.0	414.24	407.60	400.40	407.00	5.46	9000.00	126.82	8395.26	477.92
21965.000	540.00	0.0	0.0	406.09	413.60	401.20	413.70	2.61	1000.00	0.0	1000.00	0.0
21965.000	540.00	0.0	0.0	409.04	413.60	401.20	413.70	3.92	3000.00	0.0	3000.00	0.0
21965.000	540.00	0.0	0.0	410.65	413.60	401.20	413.70	4.52	4475.00	0.0	4475.00	0.0
21965.000	540.00	0.0	0.0	411.99	413.60	401.20	413.70	4.96	5875.00	0.0	5875.00	0.0
21965.000	540.00	0.0	0.0	412.95	413.60	401.20	413.70	5.26	7000.00	0.0	7000.00	0.0
21965.000	540.00	0.0	0.0	413.74	413.60	401.20	413.70	5.51	8000.00	0.01	7999.99	0.00
21965.000	540.00	0.0	0.0	414.50	413.60	401.20	413.70	5.74	9000.00	1.07	8998.87	0.06
23220.000	1255.00	0.0	0.0	406.77	415.60	401.00	414.00	1.89	1000.00	0.0	1000.00	0.0
23220.000	1255.00	0.0	0.0	409.83	415.60	401.00	414.00	2.82	3000.00	0.0	3000.00	0.0
23220.000	1255.00	0.0	0.0	411.50	415.60	401.00	414.00	3.25	4475.00	0.0	4475.00	0.0
23220.000	1255.00	0.0	0.0	412.88	415.60	401.00	414.00	3.57	5875.00	0.0	5875.00	0.0
23220.000	1255.00	0.0	0.0	413.87	415.60	401.00	414.00	3.80	7000.00	0.0	6999.14	0.86
23220.000	1255.00	0.0	0.0	414.68	415.60	401.00	414.00	3.97	8000.00	0.0	7985.40	14.59
23220.000	1255.00	0.0	0.0	415.45	415.60	401.00	414.00	4.10	9000.00	0.0	8898.31	101.70
25615.000	2395.00	0.0	0.0	409.15	410.00	404.80	410.30	3.56	1000.00	0.0	1000.00	0.0
25615.000	2395.00	0.0	0.0	412.04	410.00	404.80	410.30	5.14	3000.00	1.23	2986.49	12.29
25615.000	2395.00	0.0	0.0	413.55	410.00	404.80	410.30	5.86	4475.00	5.21	4342.39	127.40
25615.000	2395.00	0.0	0.0	414.77	410.00	404.80	410.30	6.31	5875.00	11.09	5491.60	372.31
25615.000	2395.00	0.0	0.0	415.67	410.00	404.80	410.30	6.60	7000.00	17.14	6371.37	611.49
25615.000	2395.00	0.0	0.0	416.41	410.00	404.80	410.30	6.84	8000.00	23.36	7134.20	842.44
25615.000	2395.00	0.0	0.0	417.10	410.00	404.80	410.30	7.06	9000.00	30.31	7884.79	1084.90
26545.000	930.00	0.0	0.0	411.90	412.90	408.20	413.40	4.28	1000.00	0.0	1000.00	0.0
26545.000	930.00	0.0	0.0	414.35	412.90	408.20	413.40	6.11	3000.00	9.16	2990.70	0.15
26545.000	930.00	0.0	0.0	415.65	412.90	408.20	413.40	6.94	4475.00	123.76	4349.81	1.43
26545.000	930.00	0.0	0.0	416.69	412.90	408.20	413.40	7.51	5875.00	341.56	5529.61	3.83
26545.000	930.00	0.0	0.0	417.46	412.90	408.20	413.40	7.86	7000.00	555.05	6432.73	12.22
26545.000	930.00	0.0	0.0	418.10	412.90	408.20	413.40	8.12	8000.00	759.47	7196.70	43.83
26545.000	930.00	0.0	0.0	418.71	412.90	408.20	413.40	8.33	9000.00	971.74	7925.23	103.03
27595.000	1050.00	0.0	0.0	423.10	434.50	420.80	434.20	6.56	1000.00	0.0	1000.00	0.0
27595.000	1050.00	0.0	0.0	424.61	434.50	420.80	434.20	9.66	3000.00	0.0	3000.00	0.0
27595.000	1050.00	0.0	0.0	425.50	434.50	420.80	434.20	10.95	4475.00	0.0	4475.00	0.0

TILTON TOWN DAM

GR	453.300	980.000	452.400	1000.000	444.400	1010.000	443.600	1048.000	430.800	1048.100
GR	430.800	1195.900	443.200	1196.000	444.100	1208.000	446.500	1208.100	442.900	1216.000
GR	439.800	1216.100	439.400	1228.000	450.000	1228.100	0.0	0.0	0.0	0.0
SB	0.900	10.000	3.000	0.0	0.100	0.010	0.010	0.0	434.400	430.800
X1	28015.000	17.000	932.000	1076.100	5.000	5.000	5.000	0.0	0.0	0.0
X2	0.0	0.0	1.000	434.400	440.400	0.0	0.0	0.0	0.0	0.0
BT	17.000	864.000	453.300	0.0	884.000	452.400	0.0	894.000	444.400	0.0
BT	932.000	443.400	0.0	932.100	442.900	434.500	942.000	442.900	434.500	942.100
BT	443.400	0.0	944.000	443.400	0.0	944.100	440.400	0.0	1068.000	440.400
BT	0.0	1068.100	443.900	0.0	1070.000	443.900	0.0	1070.100	442.400	437.000
BT	1076.000	442.400	437.000	1076.100	443.900	0.0	1108.000	440.000	0.0	1108.100
BT	450.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GR	453.300	864.000	452.400	884.000	444.400	894.000	443.400	932.000	434.400	932.100
GR	434.400	942.000	443.400	942.100	443.400	944.000	440.400	944.100	440.400	1068.000
GR	443.900	1068.100	443.900	1070.000	436.900	1070.100	436.900	1076.000	443.900	1076.100
GR	440.000	1108.000	450.000	1108.100	0.0	0.0	0.0	0.0	0.0	0.0
NC	0.0	0.0	0.0	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	28027.000	17.000	1006.000	1173.000	12.000	12.000	12.000	0.0	3.000	0.0
GR	453.100	965.000	452.200	984.000	449.600	1000.000	449.000	1006.000	442.100	1025.000
GR	440.800	1027.000	437.300	1035.000	436.800	1063.000	433.800	1086.000	434.800	1103.000
GR	432.100	1126.000	435.300	1148.000	434.800	1164.000	437.700	1167.000	444.600	1173.000
GR	447.400	1173.100	448.100	1190.000	0.0	0.0	0.0	0.0	0.0	0.0
X1	28071.000	0.0	0.0	0.0	60.000	70.000	44.000	0.0	-3.000	0.0
NC	0.080	0.0	0.035	0.300	0.500	0.0	0.0	0.0	0.0	0.0
X1	28525.000	25.000	1051.000	1179.000	360.000	520.000	454.000	0.0	0.0	0.0
GR	465.900	521.000	463.700	587.000	462.800	619.000	461.500	666.000	460.600	696.000
GR	455.800	815.000	451.700	858.000	451.400	967.000	451.800	982.000	451.100	1000.000
GR	450.600	1003.000	441.800	1018.000	441.600	1025.000	443.000	1033.000	443.200	1051.000
GR	440.900	1063.000	438.800	1070.000	433.900	1094.000	436.200	1112.000	434.900	1140.000
GR	435.900	1164.000	440.900	1174.000	445.000	1179.000	446.600	1200.000	448.800	1206.000
EJ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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SUMMARY PRINTOUT

SECNO	XLCH	ELTRD	ELLC	CWSEL	XLBEL	ELMIN	RBEL	VCH	Q	QLOB	QCH	QROB
14790.000	220.00	0.0	0.0	400.97	405.20	394.50	405.10	1.96	1000.00	0.0	1000.00	0.0
14790.000	220.00	0.0	0.0	405.16	405.20	394.50	405.10	2.74	3000.00	0.0	3000.00	0.00
14790.000	220.00	0.0	0.0	407.03	405.20	394.50	405.10	3.22	4475.00	3.57	4468.82	2.61
14790.000	220.00	0.0	0.0	408.57	405.20	394.50	405.10	3.57	5875.00	31.26	5831.25	12.48
14790.000	220.00	0.0	0.0	409.65	405.20	394.50	405.10	3.80	7000.00	101.72	6872.66	25.61
14790.000	220.00	0.0	0.0	410.51	405.20	394.50	405.10	3.99	8000.00	193.78	7765.47	40.76
14790.000	220.00	0.0	0.0	411.35	405.20	394.50	405.10	4.15	9000.00	314.35	8624.16	61.50
16245.000	1455.00	0.0	0.0	401.32	402.00	394.30	402.00	1.43	1000.00	0.0	1000.00	0.0
16245.000	1455.00	0.0	0.0	405.51	402.00	394.30	402.00	1.96	3000.00	150.74	2753.25	96.01
16245.000	1455.00	0.0	0.0	407.41	402.00	394.30	402.00	2.24	4475.00	320.29	3866.92	287.79
16245.000	1455.00	0.0	0.0	408.99	402.00	394.30	402.00	2.44	5875.00	518.24	4850.07	506.69
16245.000	1455.00	0.0	0.0	410.08	402.00	394.30	402.00	2.57	7000.00	725.22	5585.07	689.72
16245.000	1455.00	0.0	0.0	410.97	402.00	394.30	402.00	2.67	8000.00	931.60	6210.62	857.79
16245.000	1455.00	0.0	0.0	411.82	402.00	394.30	402.00	2.76	9000.00	1159.11	6812.57	1028.32
18030.000	1785.00	0.0	0.0	403.14	404.00	399.60	404.00	3.70	1000.00	0.0	1000.00	0.0
18030.000	1785.00	0.0	0.0	406.54	404.00	399.60	404.00	4.84	3000.00	30.28	2948.82	20.89
18030.000	1785.00	0.0	0.0	408.32	404.00	399.60	404.00	5.49	4475.00	92.38	4315.66	66.96
18030.000	1785.00	0.0	0.0	409.80	404.00	399.60	404.00	5.97	5875.00	170.11	5577.41	127.48

	GR	408.400	9935.000	411.400	9958.000	423.100	9987.000	0.0	0.0	0.0	0.0
	X1	21425.000	38.000	9864.000	10000.000	700.000	1680.000	910.000	0.0	0.0	0.0
	GR	420.300	8700.000	417.400	8712.000	413.400	8727.000	414.600	8792.000	415.300	8853.000
	GR	413.300	8872.000	413.200	8945.000	411.900	8965.000	413.000	9043.000	417.700	9131.000
	GR	417.700	9267.000	417.900	9363.000	416.700	9450.000	416.400	9523.000	414.600	9610.000
	GR	413.200	9643.000	414.900	9738.000	415.100	9833.000	413.200	9858.000	407.600	9864.000
	GR	405.600	9876.000	401.800	9889.000	400.400	9913.000	401.100	9931.000	402.200	9949.000
	GR	402.900	9962.000	405.600	9996.000	407.000	10000.000	408.700	10010.000	408.800	10025.000
	GR	408.000	10032.000	412.200	10111.000	412.700	10160.000	416.100	10263.000	414.200	10275.000
	GR	418.000	10357.000	419.000	10365.000	423.000	10375.000	0.0	0.0	0.0	0.0
	X1	21965.000	21.000	848.000	1002.000	250.000	440.000	540.000	0.0	0.0	0.0
	GR	419.700	375.000	417.300	450.000	415.200	483.000	416.000	545.000	416.100	593.000
	GR	415.800	645.000	417.500	704.000	416.200	813.000	413.600	848.000	411.200	853.000
	GR	406.000	866.000	404.000	875.000	404.600	888.000	403.800	903.000	401.200	934.000
	GR	401.200	960.000	402.400	973.000	406.000	988.000	411.800	1000.000	413.700	1002.000
	GR	424.600	1015.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	NC	0.100	0.110	0.035	0.300	0.500	0.0	0.0	0.0	0.0	0.0
	X1	23220.000	20.000	783.000	990.000	1000.000	880.000	1255.000	0.0	0.0	0.0
	GR	419.800	776.000	415.600	783.000	408.100	796.000	407.000	799.000	404.700	819.000
	GR	403.500	847.000	401.000	876.000	402.600	904.000	403.600	934.000	404.900	951.000
	GR	407.000	966.000	414.000	990.000	414.400	1000.000	414.500	1084.000	414.400	1183.000
	GR	414.500	1265.000	417.400	1335.000	415.200	1438.000	413.200	1468.000	419.800	1555.000
	X1	25615.000	19.000	884.000	990.000	2600.000	720.000	2395.000	0.0	0.0	0.0
	GR	420.900	871.000	410.000	884.000	408.700	887.000	407.200	893.000	404.800	907.000
	GR	405.100	917.000	404.800	935.000	405.800	950.000	407.300	967.000	408.700	975.000
	GR	410.300	990.000	411.200	1000.000	413.200	1055.000	413.200	1092.000	411.500	1105.000
	GR	413.100	1159.000	415.700	1167.000	419.900	1185.000	420.900	1197.000	0.0	0.0
	NC	0.085	0.110	0.040	0.300	0.500	0.0	0.0	0.0	0.0	0.0
	X1	26545.000	31.000	886.000	992.000	600.000	480.000	930.000	0.0	0.0	0.0
	GR	434.700	752.000	415.400	788.000	415.400	811.000	414.200	830.000	414.600	869.000
	GR	412.900	886.000	411.300	889.000	408.200	900.000	408.800	918.000	409.800	933.000
	GR	409.700	957.000	409.700	965.000	410.500	987.000	412.100	988.000	413.400	992.000
	GR	416.800	995.000	417.100	1000.000	419.000	1052.000	418.600	1066.000	417.300	1093.000
	GR	416.900	1116.000	420.100	1144.000	422.900	1201.000	421.600	1243.000	423.200	1283.000
	GR	423.200	1291.000	420.400	1395.000	420.500	1531.000	419.900	1643.000	418.400	1656.000
	GR	424.800	1683.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	NC	0.0	0.085	0.0	0.300	0.500	0.0	0.0	0.0	0.0	0.0
	X1	27595.000	14.000	855.000	1000.000	800.000	1320.000	1050.000	0.0	0.0	0.0
	GR	440.600	816.000	440.200	848.000	434.500	855.000	423.500	870.000	421.300	890.000
	GR	421.100	899.000	420.800	918.000	421.700	946.000	421.600	958.000	423.000	971.000
	GR	423.500	974.000	434.200	1000.000	437.400	1114.000	443.400	1166.000	0.0	0.0
	X1	27910.000	19.000	1000.000	1218.000	265.000	350.000	315.000	0.0	0.0	0.0
	GR	449.200	868.000	447.600	872.000	445.700	934.000	444.200	1000.000	432.000	1020.000
	GR	428.500	1032.000	427.200	1042.000	427.200	1051.000	427.800	1072.000	427.200	1085.000
	GR	426.300	1095.000	425.800	1131.000	426.500	1167.000	428.700	1181.000	437.600	1190.000
	GR	439.000	1209.000	442.900	1218.000	443.100	1233.000	449.200	1248.000	0.0	0.0
	NC	0.0	0.0	0.0	0.300	0.500	0.0	0.0	0.0	0.0	0.0
	X1	28010.000	13.000	1048.000	1196.000	85.000	130.000	100.000	0.0	0.0	0.0

Tilton Town Dam
Test File
Both gates closed

T1 CORPS OF ENGINEERS NEW ENGLAND DIVISION-TILTON TOWN DAM
T2 ANDERSON-NICHOLS & CO. INC.
T3 WINNIPESAUKEE RIVER RATING CURVE DATA

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ	
	-1.	2.	0.	0.	0.000320	0.0	0.0	0.	404.000	0.0	
J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE	
	1.000	0.0	-1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
J3	VARIABLE CODES FOR SUMMARY PRINTOUT										
	38.000	39.000	40.000	41.000	1.000	23.000	42.000	24.000	26.000	43.000	
	13.000	14.000	15.000	0.0	38.000	1.000	50.000	61.000	51.000	53.000	
	21.000	4.000	22.000	54.000	49.000	34.000	17.000	0.0	0.0	0.0	
J6	IHLEQ	ICOPY									
	1.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
QT	7.000	1000.000	3000.000	4475.000	5875.000	7000.000	8000.000	9000.000	0.0	0.0	
NC	0.090	0.090	0.035	0.300	0.500	0.0	0.0	0.0	0.0	0.0	
X1	14790.000	18.000	841.000	1000.000	150.000	250.000	220.000	0.0	0.0	0.0	
GR	421.500	501.000	420.200	617.000	411.800	620.000	407.900	761.000	407.800	821.000	
GR	405.200	841.000	401.500	857.000	397.500	868.000	396.400	889.000	394.500	910.000	
GR	396.100	929.000	396.700	952.000	398.400	973.000	401.500	981.000	405.100	1000.000	
GR	411.000	1029.000	416.700	1041.000	421.500	1049.000	0.0	0.0	0.0	0.0	
X1	16245.000	23.000	9812.000	9981.000	1320.000	1520.000	1455.000	0.0	0.0	0.0	
GR	422.600	9078.000	418.400	9093.000	414.800	9193.000	415.100	9273.000	412.600	9428.000	
GR	410.800	9489.000	407.900	9555.000	408.400	9686.000	407.000	9695.000	402.300	9712.000	
GR	402.100	9730.000	402.000	9812.000	398.300	9849.000	396.800	9882.000	395.000	9910.000	
GR	394.300	9934.000	396.400	9964.000	402.000	9981.000	403.100	10022.000	403.700	10075.000	
GR	405.100	10142.000	410.000	10168.000	420.200	10183.000	0.0	0.0	0.0	0.0	
X1	18030.000	15.000	950.000	1050.000	1600.000	2240.000	1785.000	0.0	0.0	0.0	
GR	425.000	750.000	420.000	780.000	415.000	830.000	410.000	915.000	405.000	935.000	
GR	404.000	950.000	401.000	955.000	399.600	1000.000	400.700	1045.000	404.000	1050.000	
GR	405.000	1060.000	410.000	1080.000	415.000	1130.000	420.000	1155.000	425.000	1265.000	
X1	18620.000	14.000	795.000	1000.000	560.000	520.000	590.000	0.0	0.0	0.0	
GR	421.300	727.000	417.200	743.000	414.300	772.000	411.600	777.000	409.000	795.000	
GR	404.600	862.000	403.400	883.000	401.700	910.000	400.000	937.000	402.700	954.000	
GR	404.600	970.000	409.200	1000.000	411.000	1029.000	421.100	1100.000	0.0	0.0	
NC	0.110	0.110	0.030	0.300	0.500	0.0	0.0	0.0	0.0	0.0	
X1	20515.000	33.000	9638.000	9958.000	1720.000	1840.000	1895.000	0.0	0.0	0.0	
GR	420.900	8497.000	419.300	8536.000	413.900	8565.000	412.500	8639.000	413.800	8746.000	
GR	411.600	8885.000	414.900	8896.000	416.100	8992.000	415.600	9021.000	410.700	9051.000	
GR	411.000	9086.000	412.500	9103.000	410.000	9176.000	411.000	9213.000	411.400	9307.000	
GR	411.900	9403.000	412.100	9461.000	411.800	9513.000	412.300	9542.000	411.000	9638.000	

BREACH ANALYSIS - TILTON TOWN DAM

Determine downstream hazard if breach were to occur @ top of dam - 443.4' MSL

$Q_{p_1} = 8/27\ W_b \sqrt{g}\ y_o^{3/2}$ where: W_b = breach width

$g = 32.2\ ft/sec^2$

y_o = pool elev - u/s river bed

$W_b = 172 \times 0.40 = 69$ feet

$y_o = 443.4 - 434 = 9.4$ feet

$Q_{p_1} = 3343$ cfs

Q_{p_2} = Q going over dam other than at breach

$Q = CLH^{3/2}$

$= 3.4 \cdot 55 \cdot 3^{3/2}$

$= 972$ cfs

Assume gates closed.

Q_{p_3} = total breach = 4315 cfs

This flow is similar to the 4475 cfs used in Reference 5 (1978 ANCO study). Therefore, this profile could be utilized to estimate the level of probable damages due to dam failure under the above conditions. Elevations of potential damage points were obtained for use in the ANCO study. Looking at this profile it can be seen that the only damage caused by a breach of Tilton Town Dam would be to the Arthur S. Brown Mfg. Co. building. A portion of this building is located in the channel immediately downstream of the dam and is the working area for 2 people. Loss of life is possible. Several plants which utilize the pondage for process water would be without. Property damage could be appreciable. The pondage also supplies water to an auxiliary fire pump. Therefore, Tilton Town Dam was classified - SIGNIFICANT HAZARD.

Test Flood = 7,570 cfs

With gates closed ⇛ 446' MSL
Top of dam ⇛ 443.4' MSL
∴ Test Flood would overtop the dam by 2.6 feet. Spillway capacity @ top of dam is 2200 cfs or 29 percent of test flood with gates closed.

With gates open ⇛ 444.3' MSL
Top of dam ⇛ 443.4' MSL
∴ Dam would be overtopped by 0.9 foot. Spillway capacity including both gates open is 5300 cfs or 70 percent of test flood. Therefore, the combined capacity of both gates ⇛ <u>3100 cfs</u>.

Spillway Capacity @ test flood elevation of 446' MSL

$Q = CLH^{3/2}$

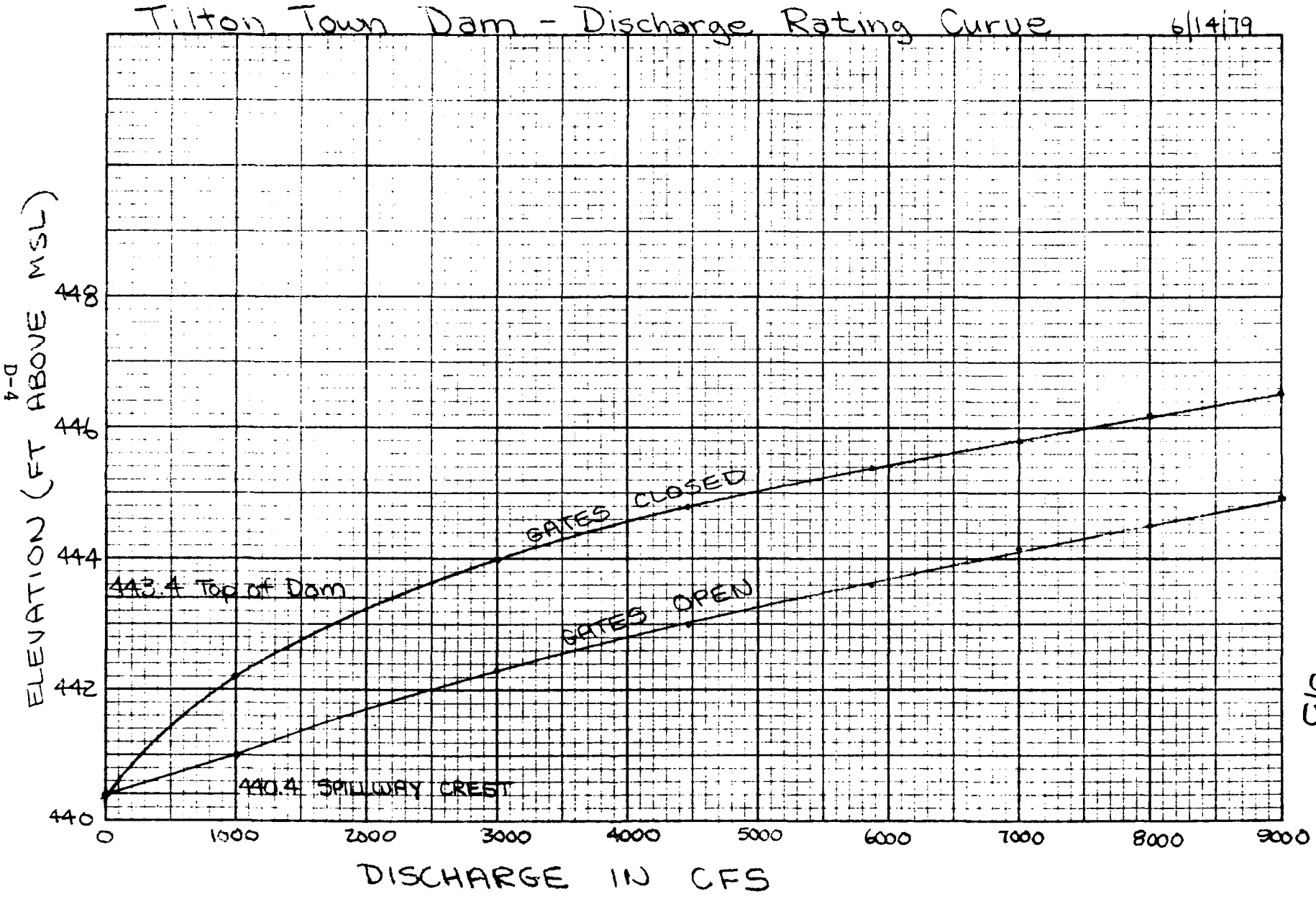
$2200 \text{ cfs} = C \cdot 124 \cdot 3.0^{3/2}$ (From HEC-2 run)

$3.41 = C$

$Q = 3.41 \cdot 124 \cdot 5.6^{3/2}$

$= 5603.5 \text{ cfs} \approx$ <u>5605 cfs</u>

Following is the HEC-2 input and summary list for a test file run under conditions of closed gates and open gates. (See pages D-7 ⇛ D-16.)


Tilton Town Dam - Discharge Rating Curve
6/14/79
ELEVATION (FT ABOVE MSL)
448
446
444
442
440
443.4 Top of Dam
440.4 SPILLWAY CREST
GATES CLOSED
GATES OPEN
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
DISCHARGE IN CFS

Water Surface elevations were computed through the use of the Corps of Engineers HEC-2 step-backwater computer program. A subsequent study was performed by ANCO in December 1978 entitled Hydraulic Engineering Analysis for Evaluating Flood Stage Reduction on the Winnipesaukee River, New Hampshire. This study utilized HEC-2 modeling and because this study is more recent and reflects existing conditions on the Winnipesaukee River, this hydraulic model was used in developing a rating curve for Tilton Town Dam. A test file covering the study area was taken from this model and various discharges ranging from 1000 cfs to 9000 cfs were analyzed. From this analysis the following rating curve points were established, assuming both gates closed:

Discharge (cfs)	Elevation (ft. above MSL)
0	440.4
1000	442.24
3000	443.96
4475	444.76
5875	445.38
7000	445.82
8000	446.21
9000	446.54

Using these points a rating curve can be drawn. See page 3.
Another HEC-2 run was made, assuming both gates are fully opened. This curve is also plotted on page 3.

APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS

END

FILMED

8-85

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